American Machinist

OCTOBER 12 1953

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

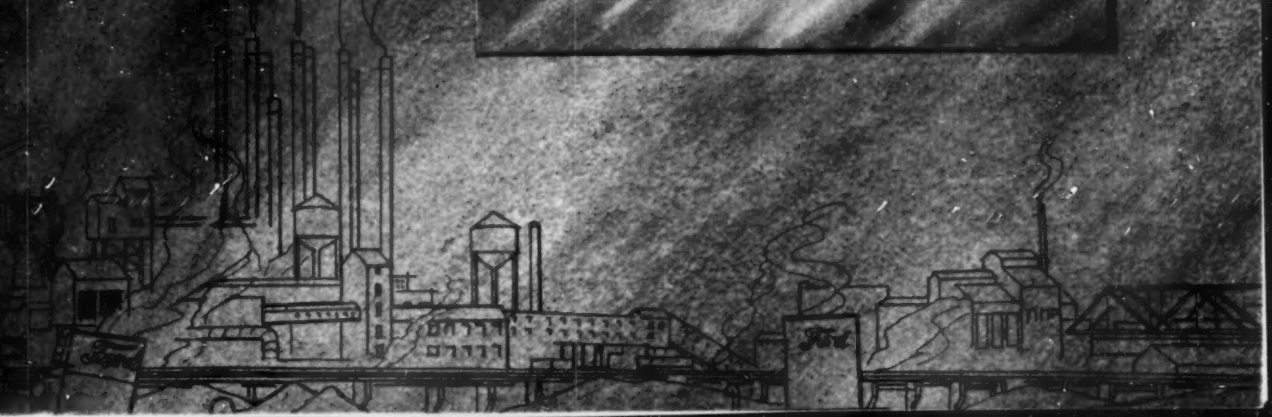
Ford

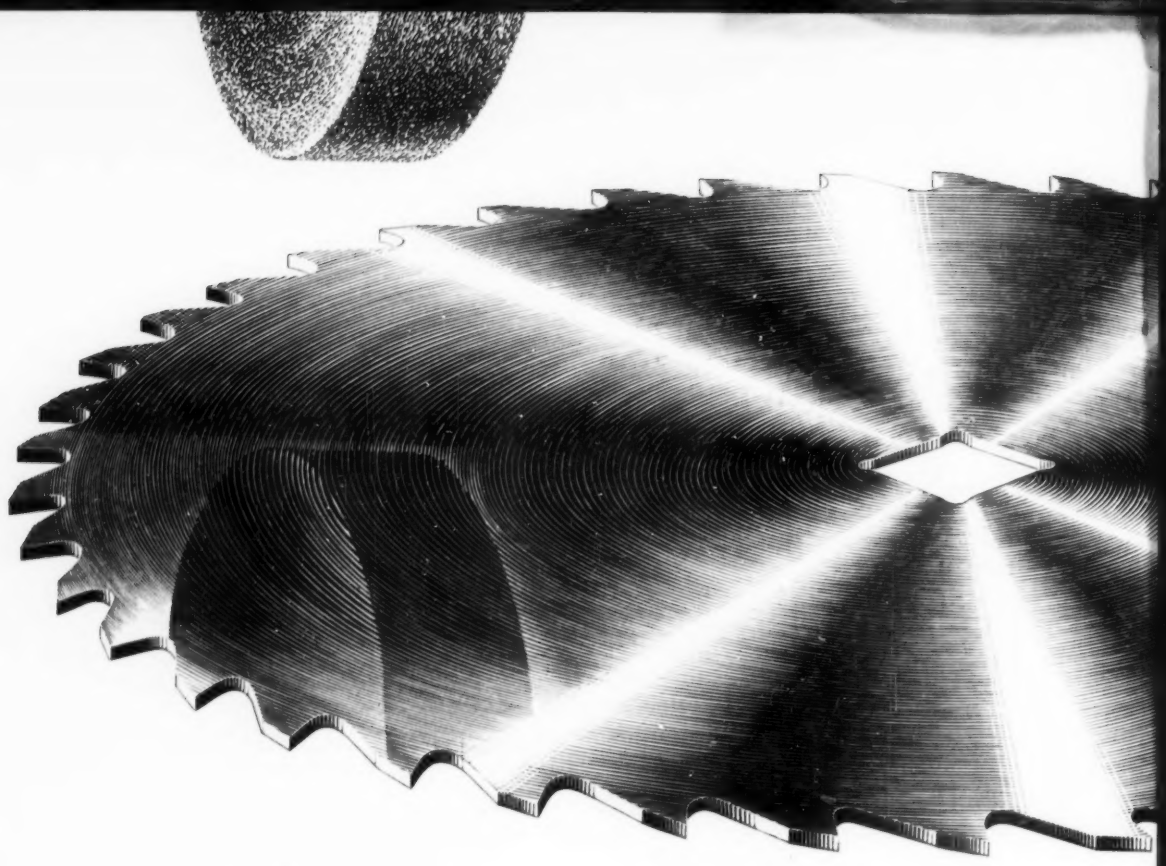
BET A BILLION ON NEW TOOLING

a 64-page special report

METAL SHOW IN PRINT

A preview of new items to be shown





Saw blades ground

190% FASTER

Grinding the surface of a circular saw blade isn't a complicated operation, to be sure. But accuracy and precision are mighty important to the success of the end product. And minutes saved per part add up to an important reduction in manufacturing cost.

Here's a case where a Heald Model 261 Rotary Surface Grinder did the job 190% faster than by previous methods. The grinding operation is performed automatically, with maximum speed and precision, at the push of a button. Swiveling of the chuck produces a .005″ taper toward the center of the blade. And loading is simply a matter of placing the blade over a center locating pin in the 12″ magnetic gap chuck, with a drive pin between teeth as an extra safeguard against slippage under heavy cuts.

Remember—when it comes to precision finishing, it pays to come to Heald.

Internal and Rotary
Surface Grinding Machines
and Bore-Matics

HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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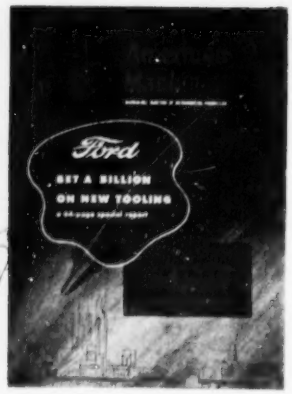


chips

TRIUMVIRATE . . . "Good things come in threes" is a very old saying, but newly appropriate here, in which we have not only three subjects to discuss, but also three distinguished gentlemen to honor. More about this duet of trios later; first we must tell how our current 64-page Special Report—the longest thus far—came about, how the familiar script signature became the block-letter FORD of today.

NO ACCIDENT . . . Our detailed report on how Ford Motor Company bet a billion dollars on new equipment—and how the bet is paying off—is no accident. Big stories never are. They are created by nose-to-the-ground sleuthing. Rupert Le Grand discovered, in a way only he knows about, that D S Harder, vice-president of manufacturing at Ford, had a group gathering modernization examples throughout company plants. At an editorial conference of more than 100 top men of Ford management with McGraw-Hill editors in Dearborn, Mich, last Jan 27 we talked with Mr Harder about it. Several days later, Ford gave us the green light, so Le Grand came from New York, Brosheer from Chicago, to begin.

CHORE . . . Rough selection of material was a chore in itself. Ford Manufacturing Engineering and Ford Photographic had combined their talents to get filing cases of data. From these, our two sleuths dug out some 300 examples. Back in New York that material was sifted, for the four-score best and most broadly applicable examples, then classified by type of operation. The 9-page lead could be done by Le Grand and no one else, but Associate Editor Emerson and Art Director Rooman did yeoman work with the pencil on the rest of it.

COOPERATION . . . A story like this is obviously not our work alone. It required much help from company executives. Functioning for Mr Harder in helping our editors was R. H. Sullican, vice-president and group executive Engine, Pressed-Metal and Parts (Mfg Divisions). He was ably assisted by D J Davis, director of Manufacturing Engineering, H C Foss, asst director, and others. As always, Ross MacNaughton of the News Bureau was an alert and competent liaison.

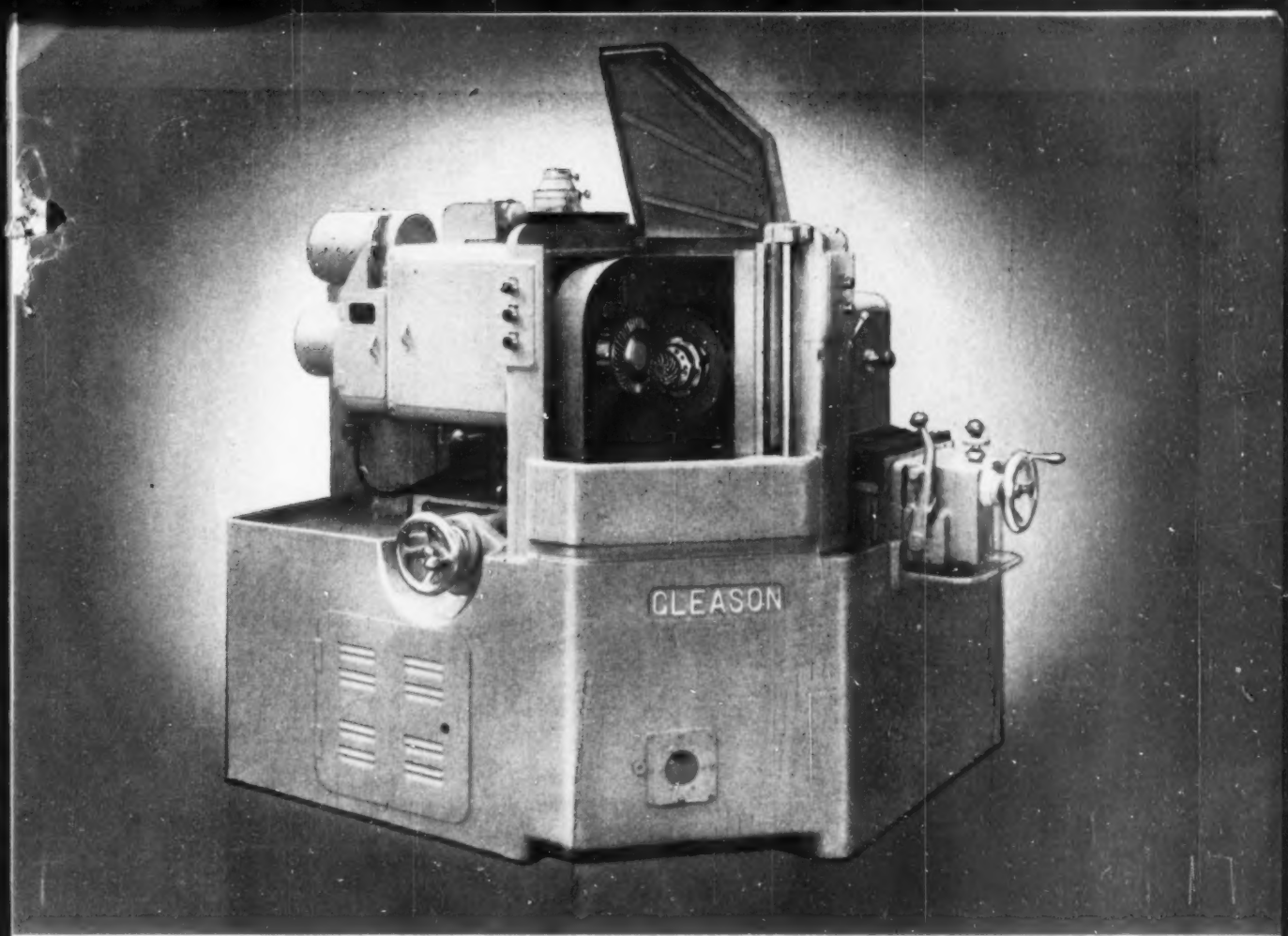
RESULT . . . The result is a readable case-study report of the biggest modernization program in the world. It will take its place with the earlier classic "firsts" on manufacturing we have gleaned from Ford —the assembly line, automation, the Cleveland Engine Plant, and use of plastiscale models. It gives you a Ford 50th anniversary present.

RED FEATHER . . . October is marked by the red feather—the reminder that you should remember your Community Chest. Hence the familiar red feather on our cover. It is appropriate here too, in that Henry Ford II has been a major factor in organizing the truly representative Community Chest campaign in Detroit.

METAL SHOW . . . We felt Metal Show time was a good one at which to break the Ford story, which covers metals from receipt to shipment. As usual, the issue also includes a preview of the Show. The Show itself starts next Monday, Oct 19, in the Cleveland Auditorium.

COMING . . . *AM* for Oct 26 will include a Special Report on rotary holding devices—a roundup on chucks, collets, *et al*. There'll also be articles on welding the hull for the Army's new tractor, on felt pads for sound isolation on a special machine, and several shorts.

Trio . . . The intaglio at left is from the medal celebrating the 50th Anniversary of the Ford Motor Company. It shows, of course, Henry, Edsel, and Henry II, three generations of Fords. We picture them in our author column because they are the authors of the developments herein described —a triumvirate who have made automotive history from the beginning. Henry Ford read *AM* faithfully, in fact credited it as the source of his idea for a gasoline-powered automobile. Here is the latest evidence of how far-reaching an effect reading can have.



SPIRAL BEVEL AND HYPOID GEARS

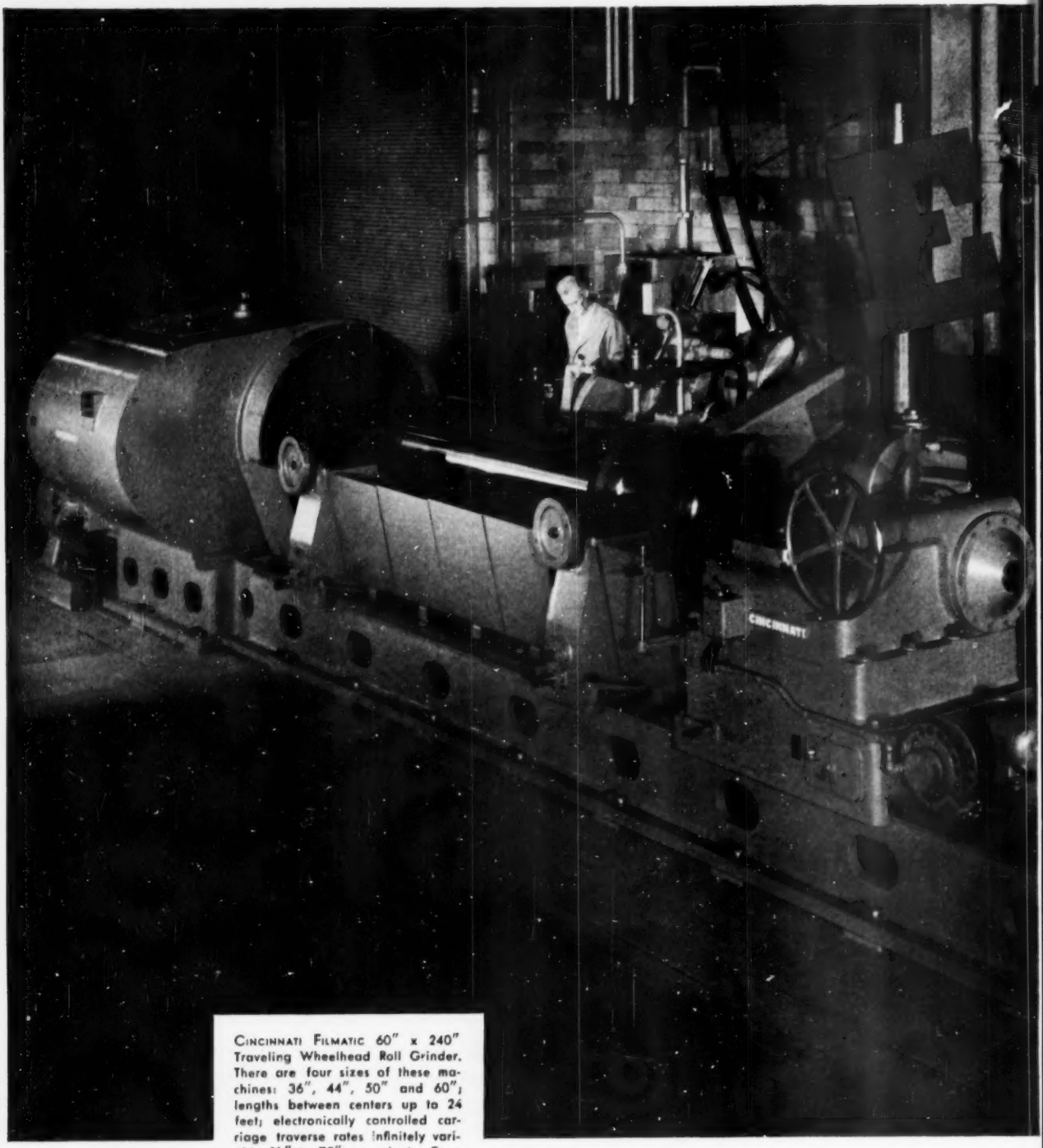
Lapped faster, better than ever before

The new **No. 19 Hypoid Lapper** is simpler to set up, has greater productivity, and assures improved quality of lapped gears up to 17" diameter. Entirely new machine features include dial-operated controls, elimination of cam systems, and automatic positioning throughout entire lapping cycle.

The No. 19 Hypoid Lapper is ideal for volume production or small quantities.

GLEASON WORKS

Rochester 3, New York

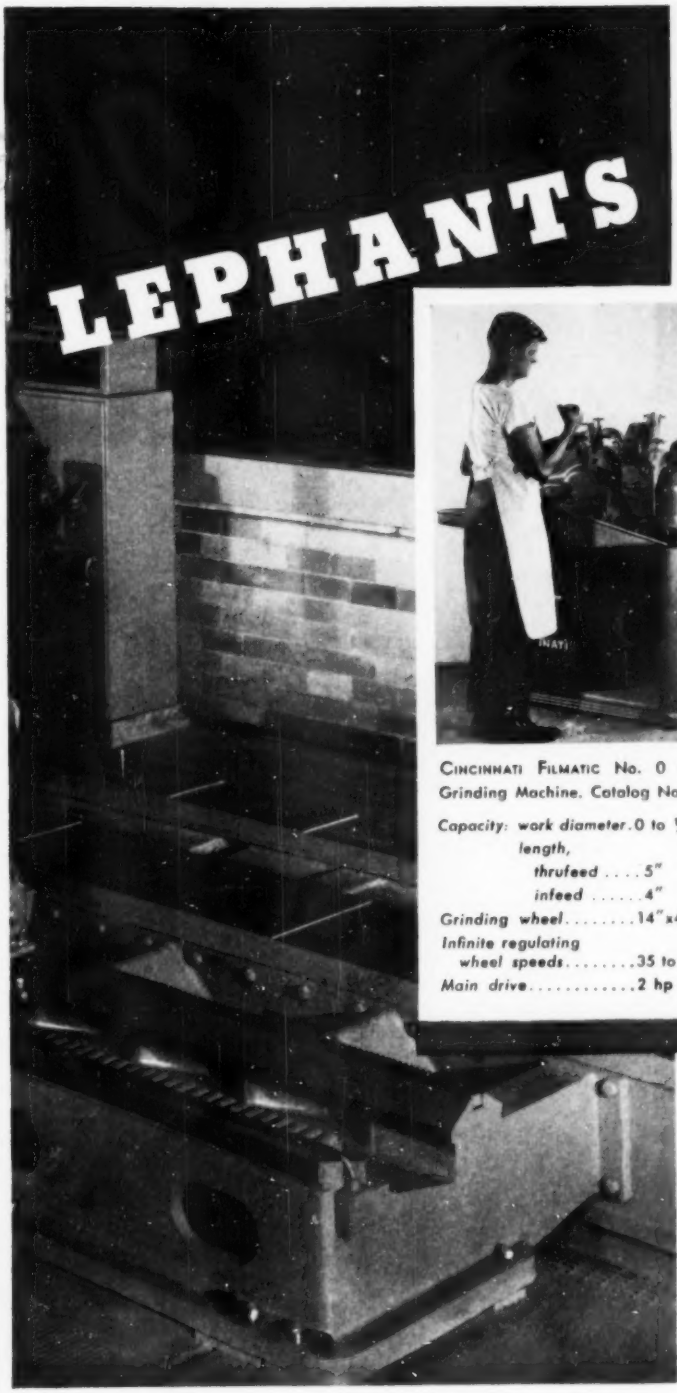


CINCINNATI FILMATIC 60" x 240" Traveling Wheelhead Roll Grinder. There are four sizes of these machines: 36", 44", 50" and 60"; lengths between centers up to 24 feet; electronically controlled carriage traverse rates infinitely variable ¾" to 75" per minute. Complete details on request.

FILMATIC

CINCIN

ELEPHANTS and Rabbits



CINCINNATI FILMATIC No. 0 Centerless Grinding Machine. Catalog No. G-576-2.

Capacity: work diameter . . . 0 to ½"
length, thrufeed . . . . 5"
infeed . . . . . 4"
Grinding wheel . . . . . 14"x4"x5" hole
Infinite regulating wheel speeds . . . . . 35 to 320 rpm
Main drive . . . . . 2 hp

of precision grinding machines bear a familiar name plate

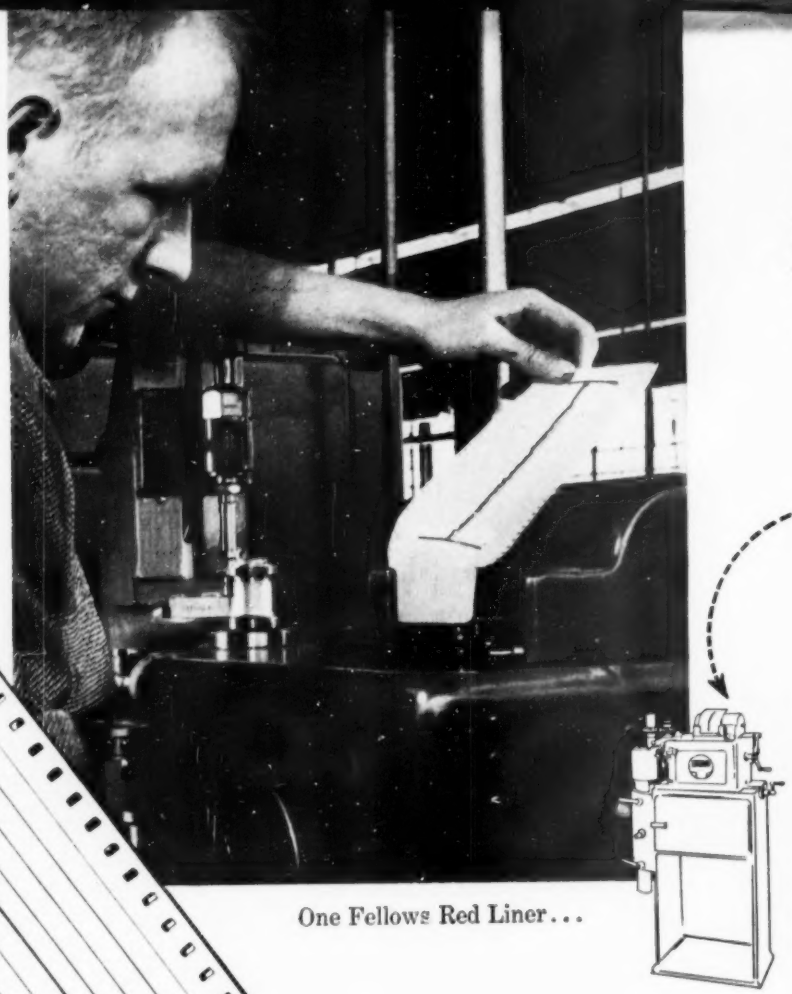
It takes long experience and extensive design and research facilities to build the elephants and rabbits of precision grinding. Cincinnati Grinders Incorporated have been doing it for over 25 years . . . they have the background and facilities for this type of work. Two examples of CINCINNATI FILMATIC Grinding Machines are illustrated here, a 60" x 240" Traveling Wheelhead Roll Grinder, weighing 149,500 pounds . . . about 45 times the weight of the No. 0 Centerless Grinder. Products ground by CINCINNATI FILMATIC centertype and centerless grinding machines range from surgical sutures .004" diameter, to steel rolls 60" diameter . . . 15,000 times as large and 665,000,000 times as heavy. Our engineering and shop facilities are at your service to equip your shop with any type of centertype, centerless, or special grinding machine for the lowest cost of production.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO
(Subsidiary of The Cincinnati Milling Machine Co.)

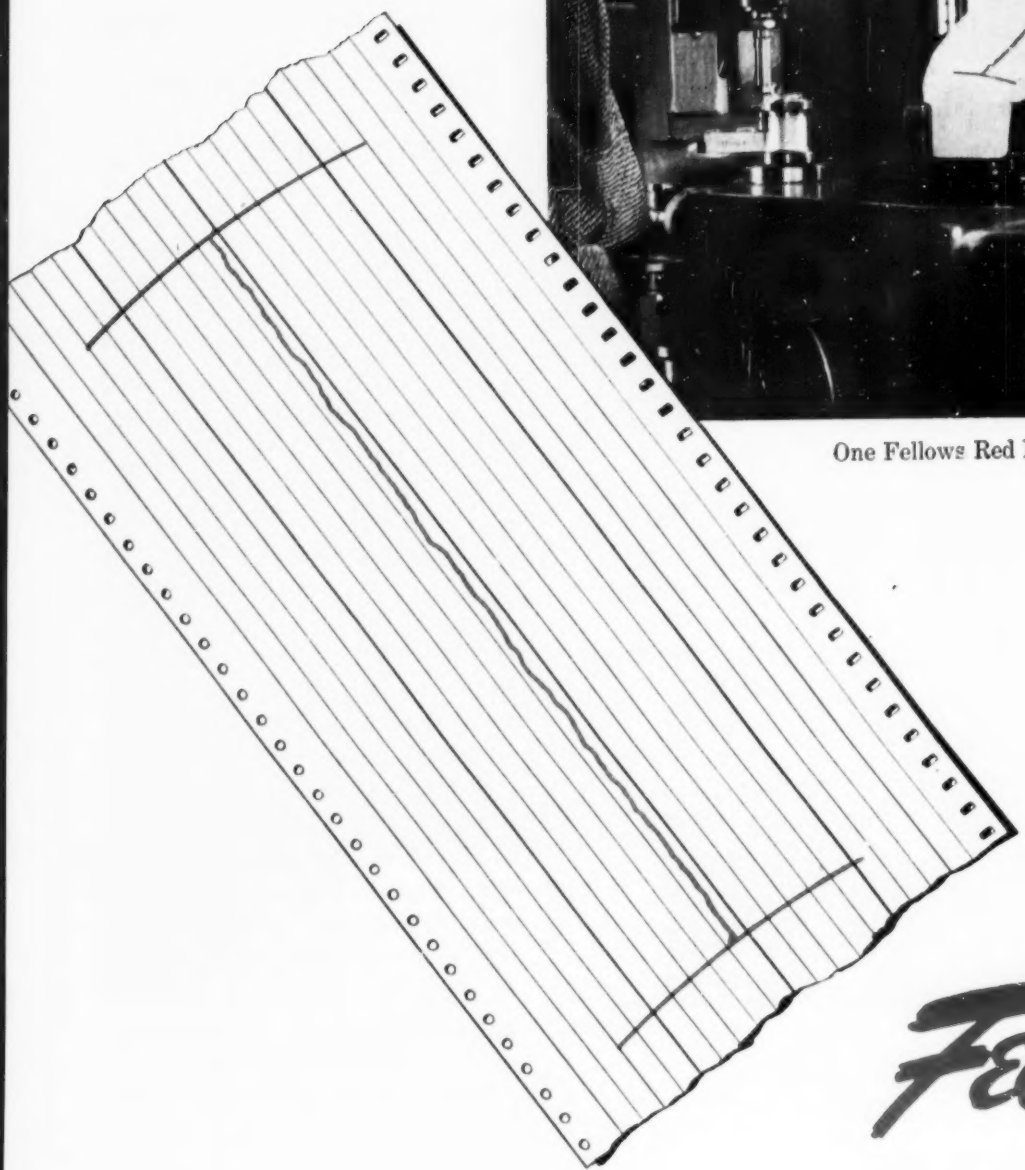
CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

The FELLOWS METHOD
...in action!



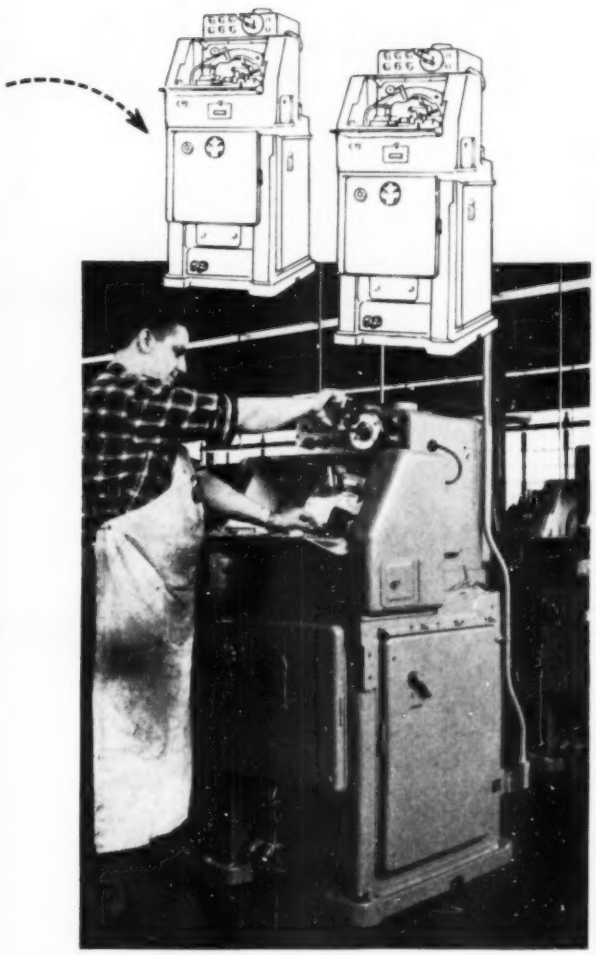
One Fellows Red Liner...



Fellows

A Sure Combination to

Mass Produce Gear ACCURACY



. . . to each pair of Fellows Shavers

Using one Red Liner with each pair of Fellows Gear Shavers has proved both practical and economical for the Arma Corporation.

Here's why . . . Arma makes basic weapon and missile control systems as well as navigational systems and remote precision control devices for the military and for industry and commerce. Hence the need for exceptional gear accuracy and for safeguards against excessive pitch line runout.

Fellows Shavers *create* that accuracy, and Fellows Red Liners *guard* it (by providing a permanent charted record of the "composite check" of each gear for quality control).

With this fast working and easy to operate Fellows combination, Arma increases production and makes wiser use of manpower.

This is a typical example of the Fellows Method in action. Why not call in a Fellows Representative and hear the details. They are interesting from *many* viewpoints.

GEAR SHAPER COMPANY

Head Office & Export Department: 78 River Street, Springfield, Vermont.
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Why Buy Three Single

SINGLE VAN NORMAN

Does the

No. 16 Ram Type Miller
Size: 37" x 9½" Cutterhead set in vertical position. Available with plain or universal saddle.

Purpose Millers when a **RAM TYPE MILLER** Work of All Three!

HORIZONTAL MILLING

Operator simply swivels the adjustable cutterhead to horizontal position . . . locks it in place . . . and he is ready for horizontal milling. Hardened stop set at factory assures positive 0° setting.

ANGULAR MILLING

With the cutterhead locked in the desired angular setting, the operator performs angular milling operations. Cutterhead is graduated in degrees from 0° to 90° for easy positioning.

VERTICAL MILLING

Conventional vertical milling is easily performed by locking the head in vertical position. Permanently fixed hardened stop permits accurate setting of cutterhead at 90°.

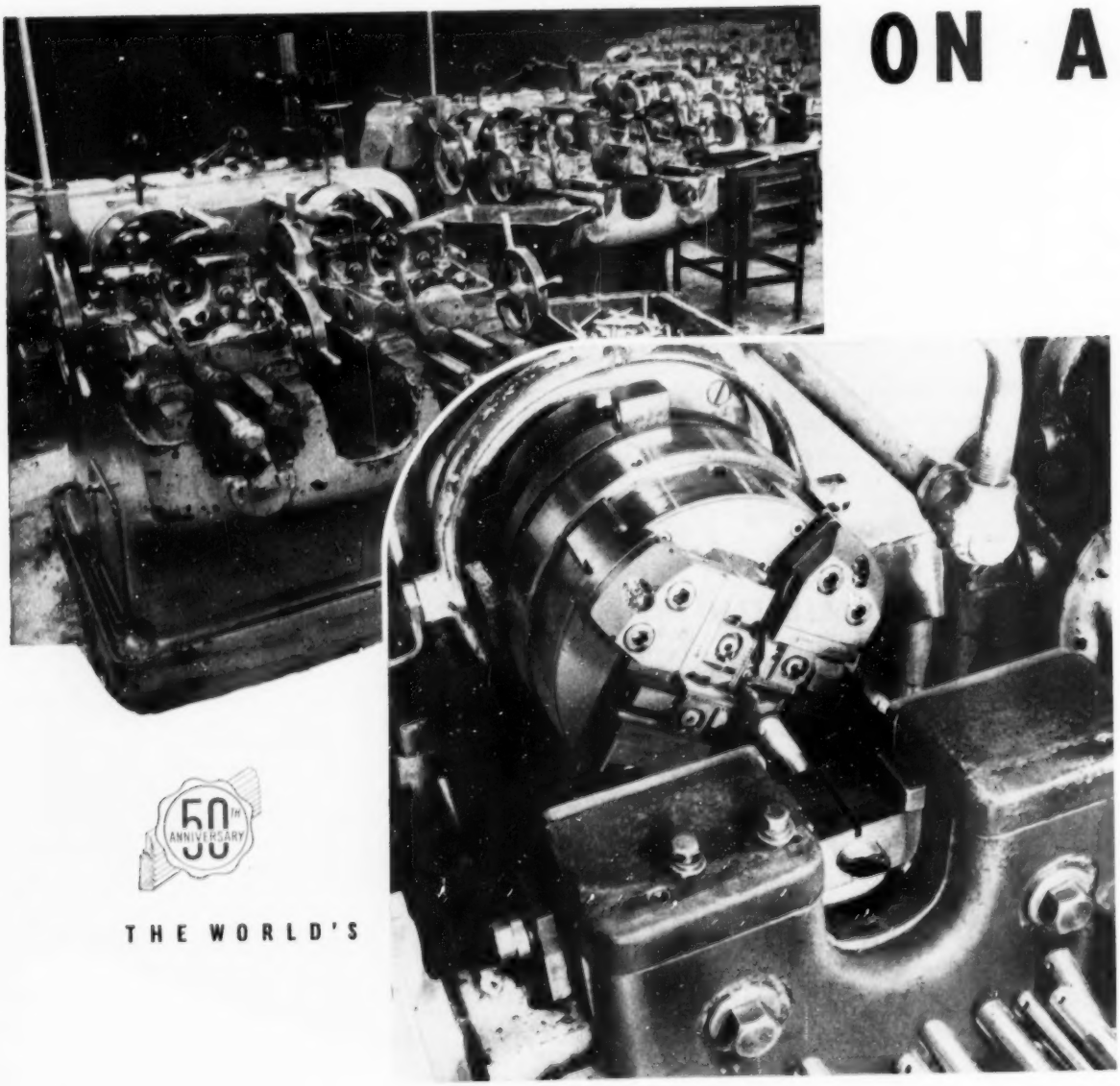
Conventional horizontal and vertical, as well as angular milling all on ONE miller . . . that's what you get with Van Norman Ram Type Milling Machines. The adjustable cutterhead, mounted on a movable ram, enables you to perform all types of milling by simply positioning the cutterhead in the desired position. Not only does this important feature give you the workability of *several single machines,* but it also minimizes work set-ups . . . cuts idle machine and operator time by permitting you to meet job to job milling requirements as they occur.

Whether it is for toolroom, production, machine shop, tool and die shop, or laboratory work, Van Norman Ram Type Millers increase production and cut costs. A wide range of models in various sizes are available to fit most every application. Write for information.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

BOLTS threaded ON A



50th ANNIVERSARY

THE WORLD'S

to ±.001

LANDMACO MACHINE

Using LANDIS Threading Equipment, the Chicago Screw Company of Bellwood, Illinois, is able to thread connecting rod bolts to better than Class 4 fit at normal production rates and economical tool cost.

Bolt blanks are of 8640 steel of 30-36 Rockwell "C" hardness. 11/16" diameter 16 pitch UN form threads must be cut 1-7/16" long over a cotter key hole. Specifications required a ±.001" tolerance on the Pitch Diameter of the thread, and finished threads are closely inspected for concentricity.

To perform this operation a 1½ LANDMACO Double-Spindle Threading Machine equipped with Leadscrew, Hardened and Ground LANCO Heads, and Chasers of special throat length and hardness was installed. In normal production, this LANDMACO Machine regularly completes 127 threaded pieces per hour cutting at 15 surface feet per minute. On an average 400 threads per head are produced between each regrinding of the chasers.

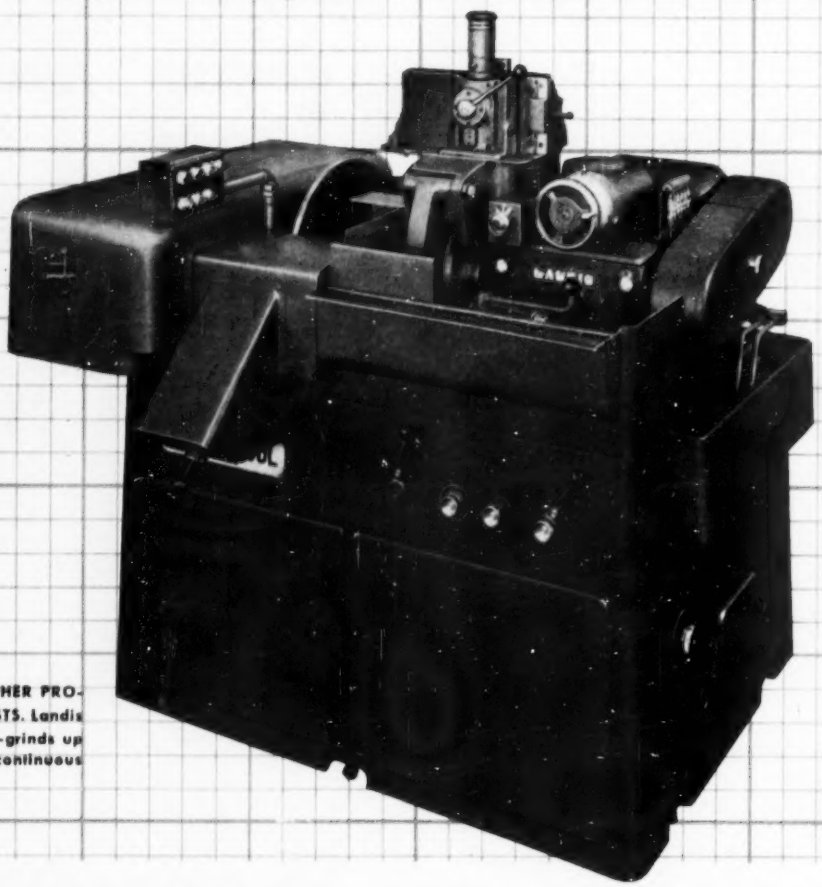
This installation illustrates the production advantages of LANDIS Equipment for difficult and exacting threading operations. The mechanically-controlled positive feed of the Leadscrew, the maximum rigidity of Die Heads designed for precision threading, and Chasers of special specifications—allow threading hard material with minimum cutting strain. As a result, threads are produced to close tolerances at economical production rates and low tool cost. For further information, ask for Bulletins H-75 (LANDMACO Machines) and F-80 (Hardened and Ground Heads). Please send specifications when writing.

LARGEST MANUFACTURERS OF THREAD GENERATING EQUIPMENT

• LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA •

JOB ENGINEERED For Lower

LANDIS Single Purpose Production Grinders



JOB ENGINEERED FOR HIGHER PRODUCTION AND LOWER COSTS. Landis Jet Blade Contour Grinder—grinds up to 5 surfaces in one continuous operation.

Landis Single Purpose Grinders are Job Engineered to meet special production problems. The need may be for reduced handling time, greater precision, automatic operation or an automatic cycle for unskilled operators. The machines illustrated here are examples of Landis Job Engineered Grinders that are solving problems such as these.

If you are thinking about reduced grinding costs, it will pay you to check with Landis. We will be pleased to give you tooling suggestions and production estimates based on your work prints.

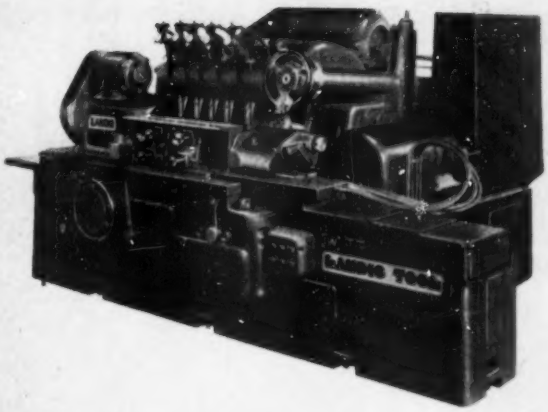
165

LANDIS

precision grinders

Unit Grinding Cost!

JOB ENGINEERED FOR LESS WORK HANDLING



Multiple Wheel Grinder

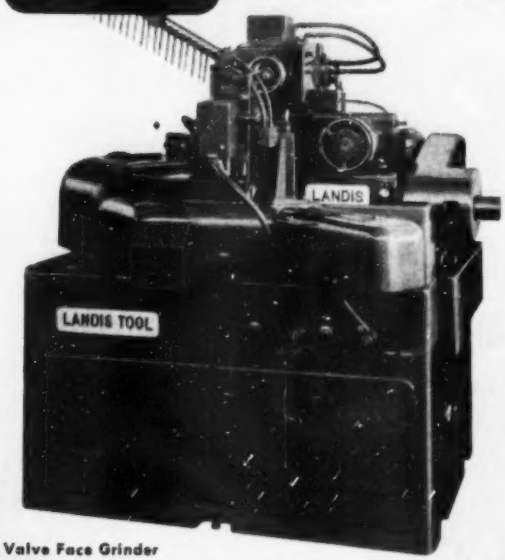
Grinds up to 10 diameters in one operation. For infeed grinding of concentric diameters in one operation—straight, tapered, profiled.

JOB ENGINEERED FOR SUPER-PRECISION

Concentric Grinder

Automatically grinds external surface concentric to bore. For high production of straight, profiled, tapered surfaces to precision tolerances.

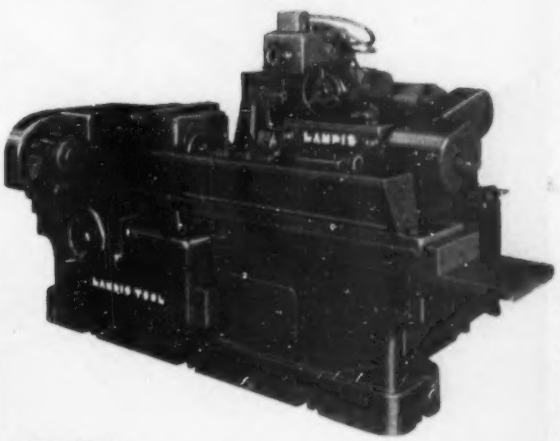
JOB ENGINEERED FOR AUTOMATIC OPERATION



Valve Face Grinder

Automatic operation triples man-hour output. Automatic loading, automatic grinding cycle and automatic unloading give low cost production.

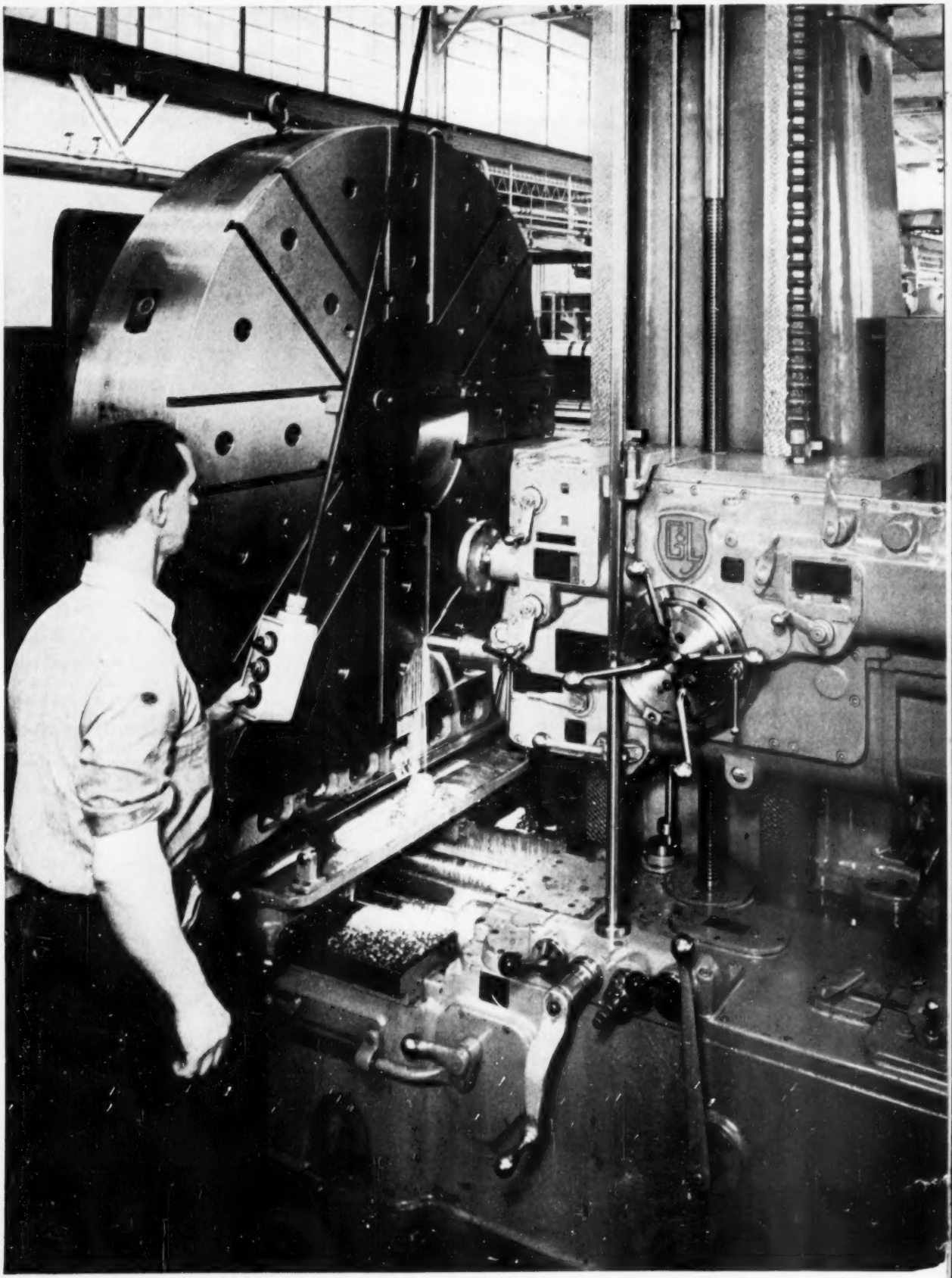
JOB ENGINEERED FOR CAM CONTOUR GRINDING



Cam Grinder

Automatic cycle permits one operator to handle several machines. Automatic grinding cycle and automatic dressing cycle require attention only for loading and unloading.

LANDIS TOOL COMPANY / WAYNESBORO, PA., U.S.A.



20-ton aspirin...

to end production headaches!

This versatile machine helps you eliminate problems of overly long floor-to-floor time . . . frequent, complicated setups...and expensive re-runs on close tolerance work. It's the G & L 30-Series table type Horizontal Boring, Drilling and Milling Machine

For either long production runs or custom jobs, G&L 30-Series machines offer you many advantages to speed work, cut costs and increase shop flexibility. They feature an unusually wide range of speed and feed selections, extreme rigidity and accuracy, plus easy, positive control.

In addition, for special jobs or special problems, they are available with a host of attachments and accessories. Any one piece of optional equipment may help you turn a previously losing proposition into a real profit-maker. This equipment includes: an Automatic Electric Positioning Device, built-in or separate revolving tables, angular milling attachments and continuous feed facing and boring heads.

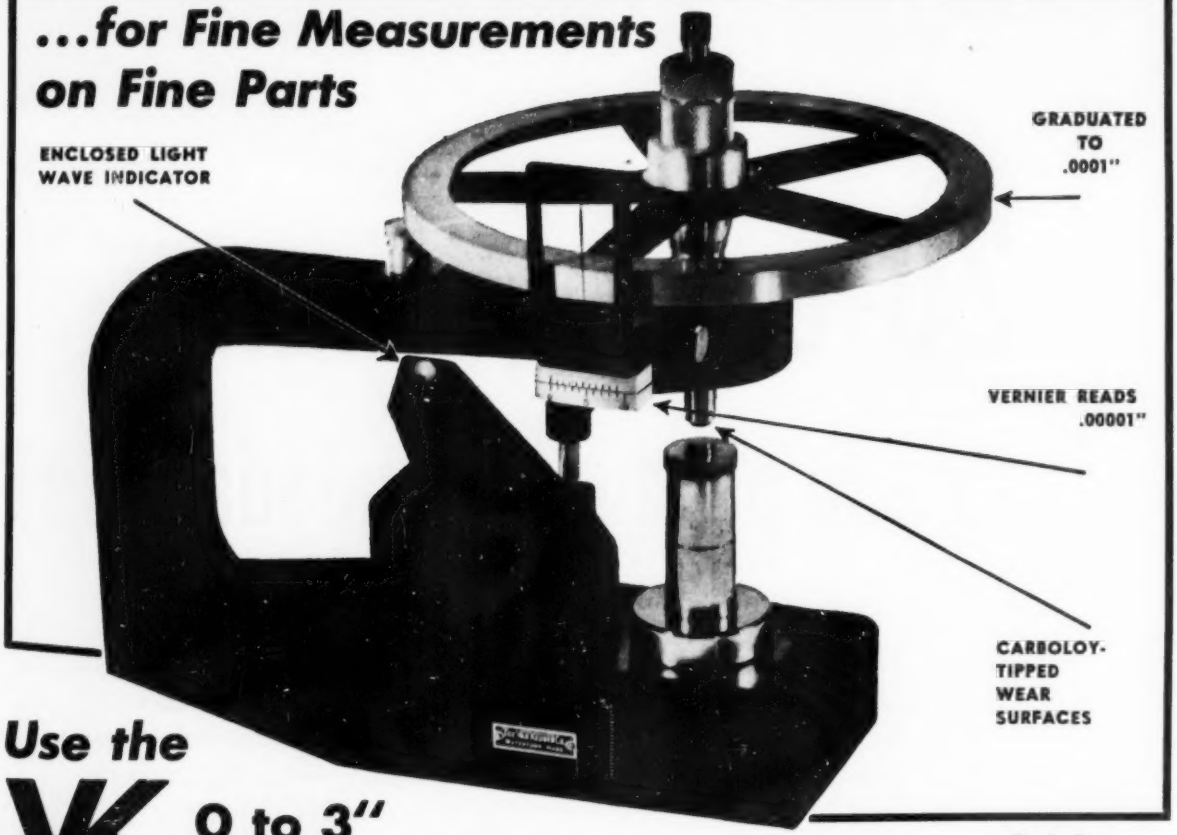
G&L table type machines are available with 3, 4, 5, 6 and 7 inch diameter spindles. Any model is available in a choice of four basic table and saddle arrangements in various sizes. For complete details on these cost-cutting, work-speeding machines, see your G&L representative or write —

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools

...for Fine Measurements on Fine Parts



Use the VK 0 to 3" LIGHT WAVE MICROMETER

The Van Keuren Light Wave Micrometer is an instrument of exceptional accuracy, ideal for measuring plug gages or small precision parts. Use it when you're after "that last hundred thousandth" involved in so many of today's measurements. The 0 to 3" instrument shown above has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy, and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non-parallax vernier index which enables readings to be made to .00001". It has an index lock and carboloy-tipped anvil and spindle. This sturdy, sensitive instrument weighs only 17 pounds, and is in reality a portable measuring machine of inbuilt and sustained accuracy.

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision . . . fast, accurate and profitable.

Catalog and Handbook No. 35

This 220-page volume represents years of research by the Van Keuren Co. It presents a simple and exact method of measuring screws and worms with wires, tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods. Ask for your copy . . . sent free on request by writing: The Van Keuren Company, 173 Waltham St., Watertown, Mass.

VK

34th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

Multiple spindle automatic builders do not deny the importance of good frame design. As early as 1920 Cone's revolutionary frame was substantial evidence that Cone did something about it.

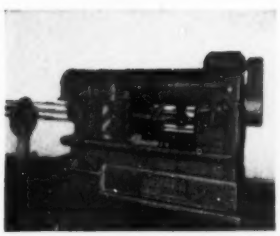
For some time there has been discussion concerning the relative merits of the use of 100% carbide tooling on multiple spindle bar automatics. There has been very little information made available about successful carbide application to this type of machine by its builders or by carbide suppliers. But Cone is doing something about it.

The Conomatic Carbide Development program is accumulating much helpful information for "automatic" users through test runs under production conditions. The illustration is an example of such information applied to an actual production run. Full data is available.

Action speaks better

MATERIAL—ALUMINUM: Hole drilled with 1" and 1 1/16" dia. drills to 1½" depth, and tapped to ¾" depth.

	HSS	CARBIDE
Cycle Time	90 secs.	**11 secs.**
Work Spindle Speed	270 R.P.M. at 104 S.F.	**830 R.P.M. at 320 S.F.**
Tool Wear	5,000 pcs. per grind	**20,000 pcs. per grind**



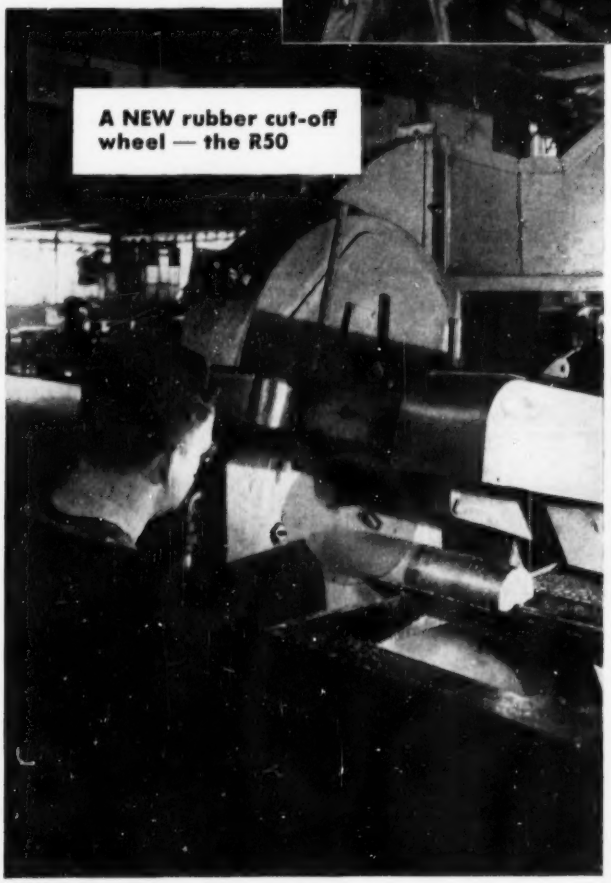
Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

For high production — The new Norton B9 resinoid bonded cut-off wheel cuts free and cool at speeds up to 16,000 surface feet per minute. An exceptional performer on both ferrous and non-ferrous metals.

See these new cut-off wheels in action at the

METAL SHOW

in Norton Space No. 1933



Where clearance counts — The new Norton R50 rubber bonded cut-off wheel has the unusual advantage of built-in chip clearance. Ideal for wet-cutting of ferrous or non-ferrous bar stock, in diameters up to 6".

Stronger, safer, more versatile — The popular Norton BN cut-off wheel, resinoid bonded, is used on all types of machines for the widest variety of metallic and non-metallic applications.

Cost-cutters for cutting-off!

Norton wheels bring the "TOUCH of GOLD" to every job

Keeping pace with the rapid improvement in cut-off techniques and equipment, each different type of cut-off wheel in the broad Norton line has individual features for top efficiency and economy in its particular job range. For example:

The new Norton B9 resinoid bonded wheel is made with either smooth sides or with the rougher "F" sides for more clearance in the cut. It is a high production wheel. The B9 cuts free and cool, with a minimum of burning, and will give you long, money-saving service in the widest range of metal-cutting applications.

The new Norton R50 cut-off wheel, rubber bonded, is designed especially for wet-cutting of bar stock up to 6" diameter. Built-in chip clearance — a great advancement in this type of wheel — is one of its advantages that assure freer, faster cutting with maximum strength and service life.

Long a great favorite for metallic and non-metallic cut-off jobs, the resinoid bonded BN wheel features versatility and safety. On low speed and high speed cut-off machines and portable grinders and saws — and on jobs ranging from cutting tile to slotting track welds — the BN has proved its ability to deliver up to six times longer wheel life, with breakage practically eliminated.

Other outstanding Norton cut-off wheels include the resinoid bonded B2 and the rubber bonded R30 and R20. The B2, a valuable general purpose cut-off wheel for the tool room, is also widely used on non-metallic materials. The R30 is recommended for small diameter work and fine slotting, while the R20 is a highly durable wheel for use where dressing action is severe.

Ask your Norton distributor about the correct Norton cut-off wheels, in ALUNDUM* abrasive or CRYSTOLON* abrasive, for your materials and machines. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

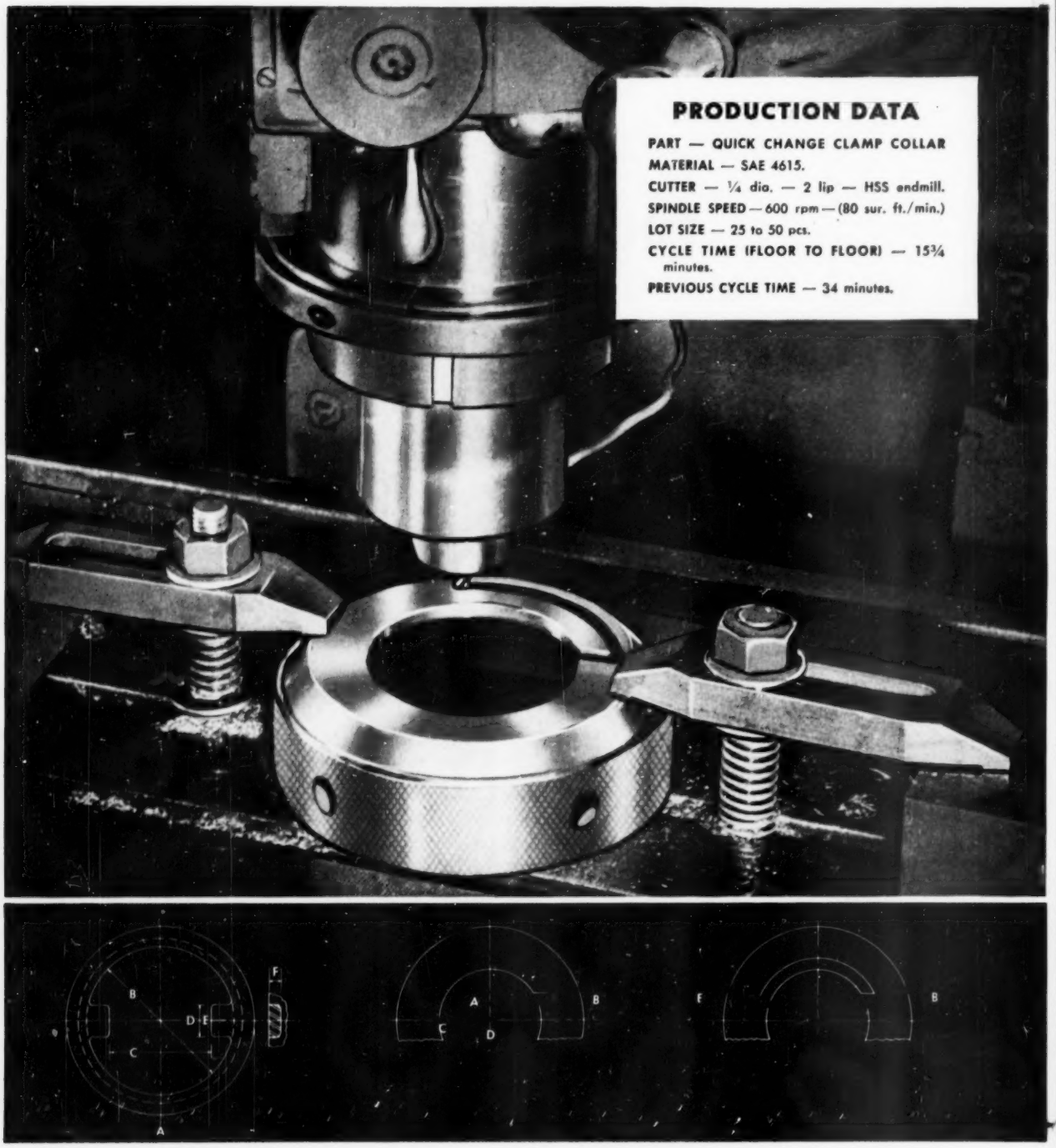
W—1515

NORTON
ABRASIVES

Making better products . . . to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

PRODUCTION TIME



PRODUCTION DATA

PART — QUICK CHANGE CLAMP COLLAR
MATERIAL — SAE 4615.
CUTTER — ¼ dia. — 2 lip — HSS endmill.
SPINDLE SPEED — 600 rpm — (80 sur. ft./min.)
LOT SIZE — 25 to 50 pcs.
CYCLE TIME (FLOOR TO FLOOR) — 15¾ minutes.
PREVIOUS CYCLE TIME — 34 minutes.

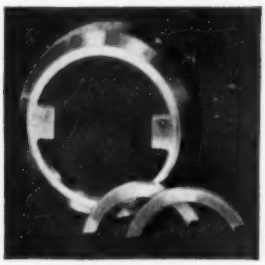
(A) 6" (B) 45⁄8" (C) 3¼"
(D) −1" + ±.000 (E) −1" + ±.005 (F) ⅜"

OPERATION 1 — Rough mill one side of tongue.
PROCEDURE — Offset spindle slide radius (A), set rotary head to angle (B), feed table to workpiece centerline (C to D).

OPERATION 2 — Rough mill radius section between tongue.
PROCEDURE — Rotate head from angle (B) to angle (E).

REDUCED BY 53%!

Rotary Head Milling Machine simplifies method and cuts costs on still another production job



Here's the completed workpiece together with two pieces of waste.

IN production of this Quick Change Clamp Collar, considerable savings were effected by using a versatile Kearney & Trecker No. 2 Model D Rotary Head milling machine.

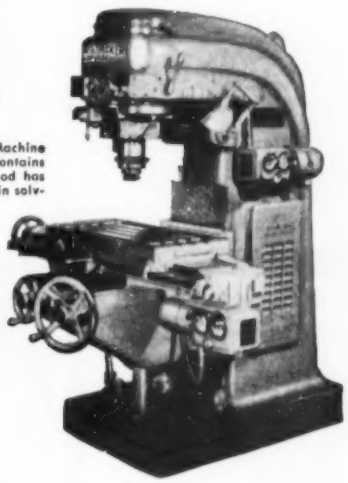
The radius of the piece was produced merely by offsetting the spindle slide and rotating the machine's head. The job was done faster, more accurately than would be possible with any other method.

Practically no other standard machine can mill these parts without a change in setup and cutters, maintain accuracy, yet complete the job in less than 16 minutes!

For details of this operation, see the diagrams below. Note: Model D's table and saddle movements are independent, will not affect the radius setting—think what that means not only to this job, but also in terms of a wider range of applications for other work.

Here's the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production, die, forging and metal pattern milling problems. It's yours for the asking.

Address requests for booklet to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

OPERATION 3 — Rough mill one side of opposite tongue.
PROCEDURE—Feed Machine table from (D) to (F).

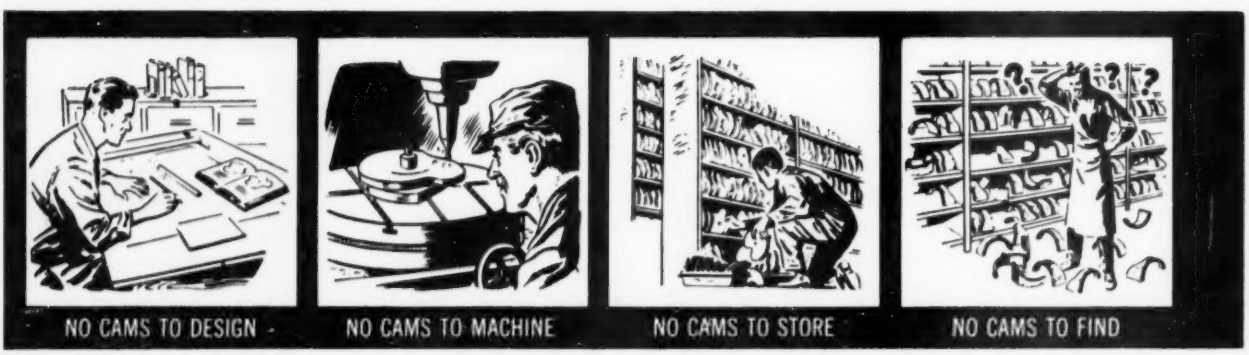
OPERATION 4 — Rough mill end of tongue.
PROCEDURE—Feed machine saddle from (F) to (G).

OPERATION 5 — Rough mill second half of inner contour.
PROCEDURE — Repeat Operations 1 through 4, working area to be in the lower half of opening.

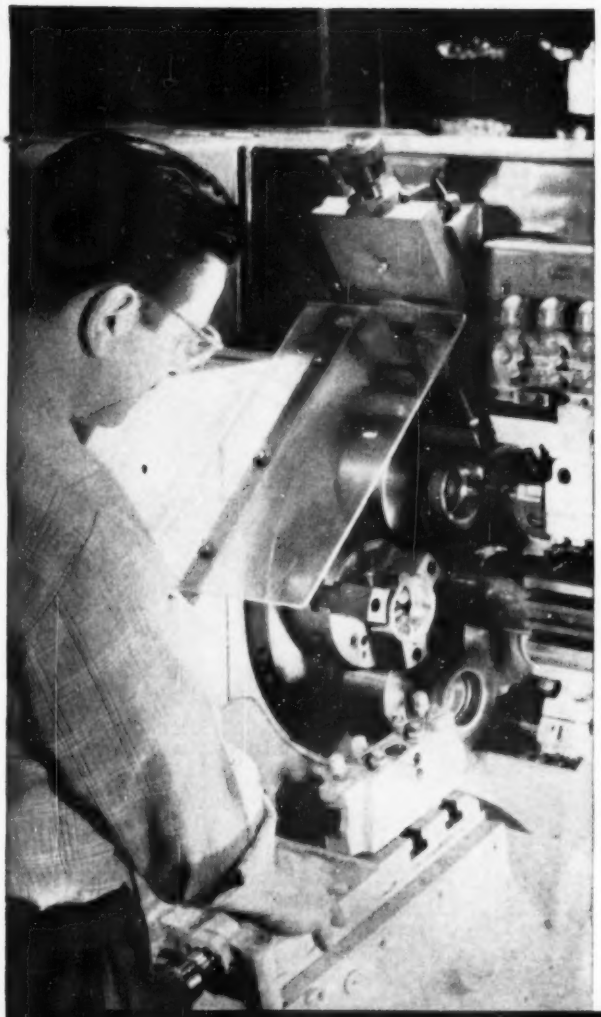
OPERATION 6 — Finish mill 4⅛" dia., end of tongues to 3¼" dimension and width of tongues to 1" + .000 —.005.
PROCEDURE — Reverse sequence of Operations 1 through 5.

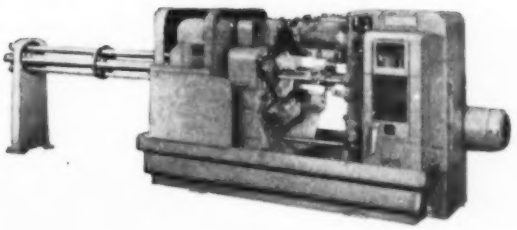
NO CAM WORRIES

with Warner & Swasey
Multi-Spindle Automatics



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY





Automatic Bar Machines	1¾" Standard Capacity
	2¼" Oversize Capacity
and now, newly introduced	
	¾" Bar Capacity
	1¼" Bar Capacity
Automatic Chucking Machine	6" Swing

● Just make a simple setting on a Warner & Swasey—and there you have your new feed stroke, clearly indicated on a graduated scale. Yes, it's as easy as that! All feed strokes are quickly available for both longitudinal and cross slides. No more need to sacrifice cycle time because the "right" cam is not on hand or because a cam change would take too long. You always get your exact feed stroke quickly on Warner & Swasey Multi-Spindle Automatics.

NO CAMS TO CHANGE

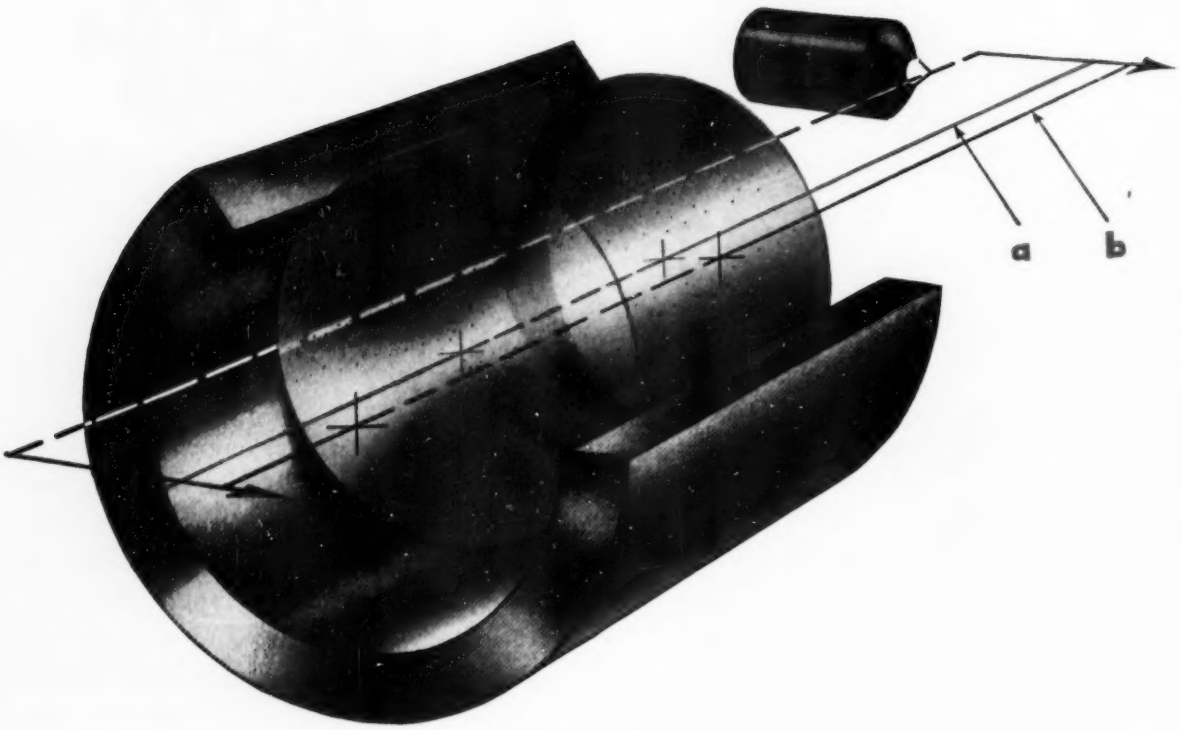
IT'S SIMPLE TO SET UP!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

alignment

for better internal grinding

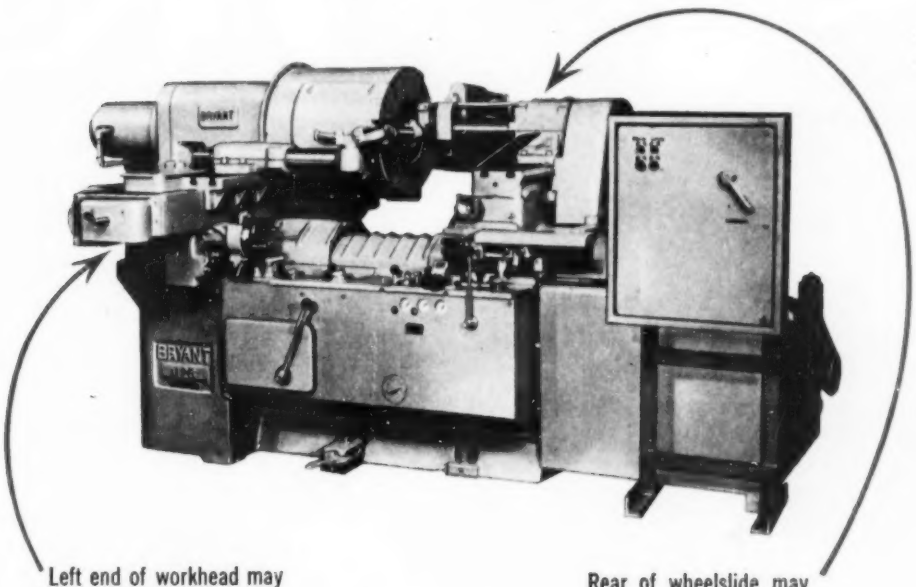


THE heart of the internal grinding process is the line of contact between the wheel and the work. This contact line must be straight for the full length of the wheel and the full length of work as the wheel traverses. If the contact is not a straight line, the internal grinder is "out of line". Improper alignment may show up in the work as incorrect hole geometry (bell-mouth or taper) and poor surface finish. In addition, excessive wheel wear and poor wheel action may result.

Several elements contribute to the straightness of this line of contact: first, the path along which the wheel is traversed "a" must be a straight line; second, the axis of the wheel must lie in a plane parallel to the wheel path "a", and third, the axis of the work "b" must be parallel to the wheel

path "a". For production grinding, the diamond must lie in the plane established by the wheel axis and the work axis.

Perfect alignment means that the slides must be straight and true, the wheel and work spindles must be in line and "zeroed" for center heights and the diamond must be on "dead center" of the wheel. A full, straight line of contact will extend wheel life, improve wheel action, and will assure correct geometry and required finish.


BRYANT
Left end of workhead may be raised or lowered to bring its axis into a plane parallel with wheelslide bar.
Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

This heavy-duty, semiautomatic machine, with hydraulic controls, has a 26″ swing and will grind holes with a maximum depth of 12″. Although designed for large, heavy work, a selection of wheelheads is available to grind holes as small as 1″ in diameter. The extremely rugged bed provides the strength and rigidity necessary for vibrationless operation. The workhead has two positions, one for grinding and a forward position for ease in loading and checking large work. The wheelhead is adjustable to grind work up to 15° included angle. The Bryant workhead and wheelhead slides are anti-friction to provide extremely accurate grinding and sensitive control.

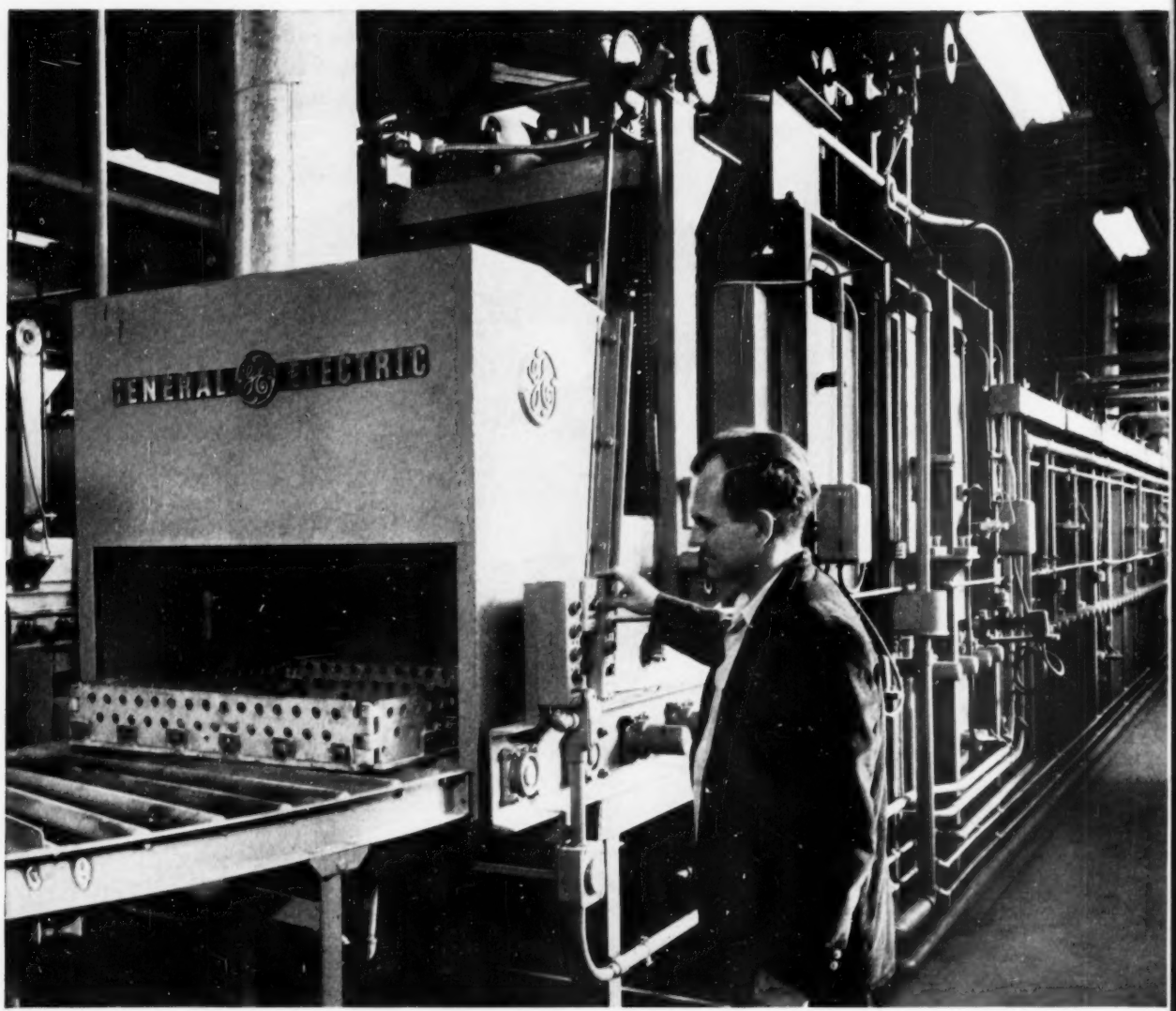
Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

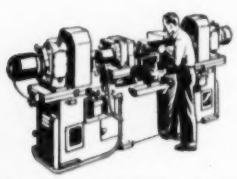
Internal Grinders • Internal & External Thread Gages • Granite Surface Plates • Boring Machines

LINK-BELT ball and

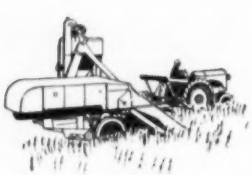


Jet engine parts are heat-treated in General Electric roller-hearth furnaces at the Aviation Division of The Bingham-Herbrand Corporation, Freemont, Ohio. To counteract high temperatures, the Link-Belt ball bearing flanged blocks are water-cooled. Like other manufacturers of equipment that must operate efficiently under the toughest service conditions, GE utilizes various types of precision Link-Belt bearings.

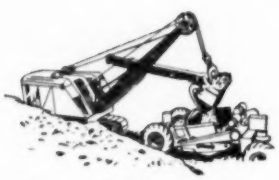
LINK-BELT ball and roller bearings



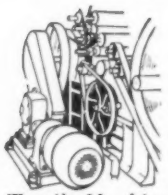
Metal Working Machinery



Farm Machinery



Construction Equipment



Textile Machines

roller bearings

...keep company with America's hardest-working machines

WHERE loads are heaviest and operating conditions most severe—you can always rely on Link-Belt precision ball and roller bearings. That's why so many top equipment designers specify Link-Belt for their tough-job applications.

Thousands of installations have proved the dependability of Link-Belt bearings. Quality construction throughout—combined with precision manufacture—assures the ultimate in accuracy and long life.

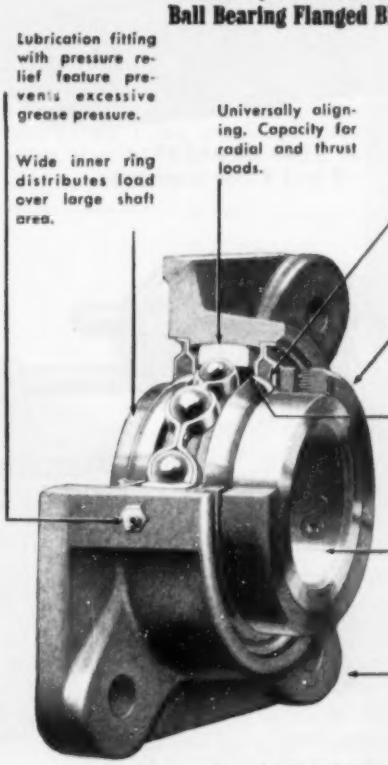
There are Link-Belt ball or roller bearings to meet every industrial need. And there's a Link-Belt bearing engineer near you to help apply them to your particular requirements. You can also get all the facts from Data Book 2550.

LINK-BELT

BALL and ROLLER BEARINGS

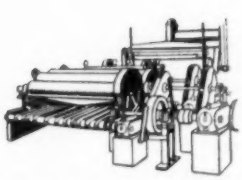
LINK-BELT COMPANY: Plants: Indianapolis, Chicago, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Scarboro, Ont. (Canada), Toronto (Canada), Elmira, Ont. (Canada), Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,273

Cutaway of Series 200 Ball Bearing Flanged Block


Lubrication fitting with pressure relief feature prevents excessive grease pressure.
Wide inner ring distributes load over large shaft area.
Universally aligning. Capacity for radial and thrust loads.
Self-aligning seals effectively keep grease in and dirt out, regardless of alignment.
Spring-locking collar with set-screw clamps bearing firmly on shaft.
Lubricant passes freely into large reservoir to lubricate moving surfaces.
Easily installed by slipping bearing onto shaft and clamping inner ring by tightening two set-screws in spring locking collar.
Sturdy, compact cast housing requires minimum support space, can be positioned on the side of a machine.

One of many types in the Link-Belt line of Pillow Blocks, Flanged, Flanged Cartridge, Cartridge, Hanger, Take-Up Blocks and Unmounted Bearings.

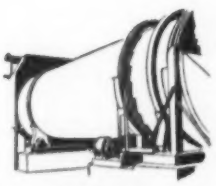
smooth the path of power for all industry



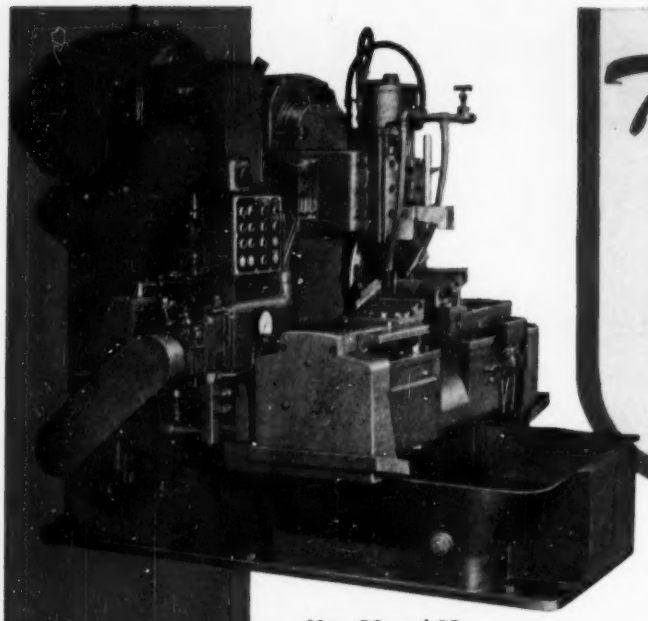
Pulp & Paper Machinery

Materials Handling Equipment

Oil Field Equipment



Processing Equipment

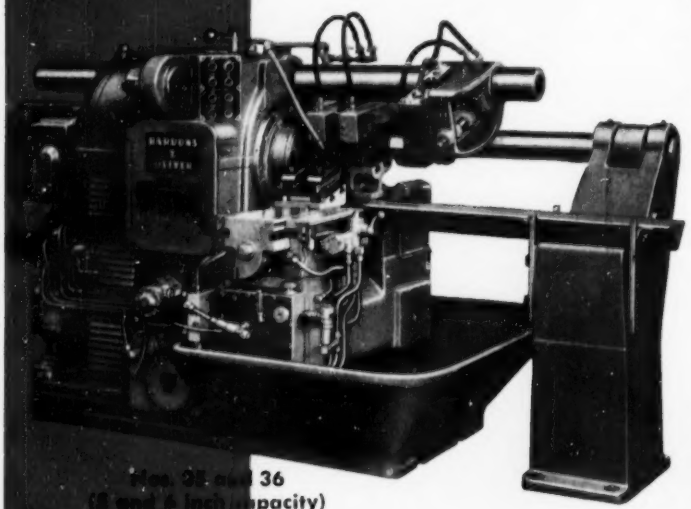


Nos. 38 and 39
(8 and 9 inch capacity)

The WORLD'S Manufacturer CUTTING-OFF

★ FULL AUTOMATIC ★
★ HAND OPERATED

BARDONS & OLIVER, work rotating type, cutting-off lathes are designed and engineered for *maximum* production. Rigid construction, hydraulic feeds, anti-friction bearings, heat treated alloy steel gears, hardened and ground steel ways, are only a few of their features.



Nos. 35 and 36
(5 and 6 inch capacity)

Nos. 33 and 34
(3 and 4 inch capacity)

BARDONS & OLIVER, INC.

1134 WEST 9TH STREET • CLEVELAND 13, OHIO

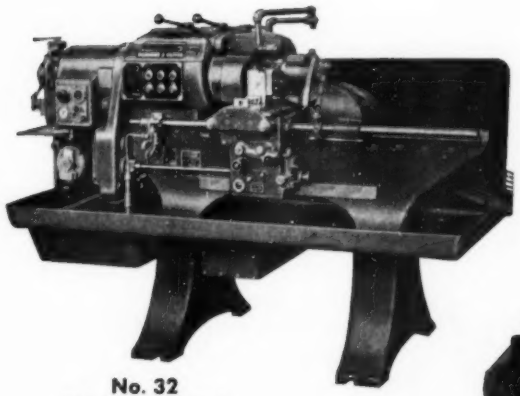
Foremost of . . .

LATHES

SEMI-AUTOMATIC

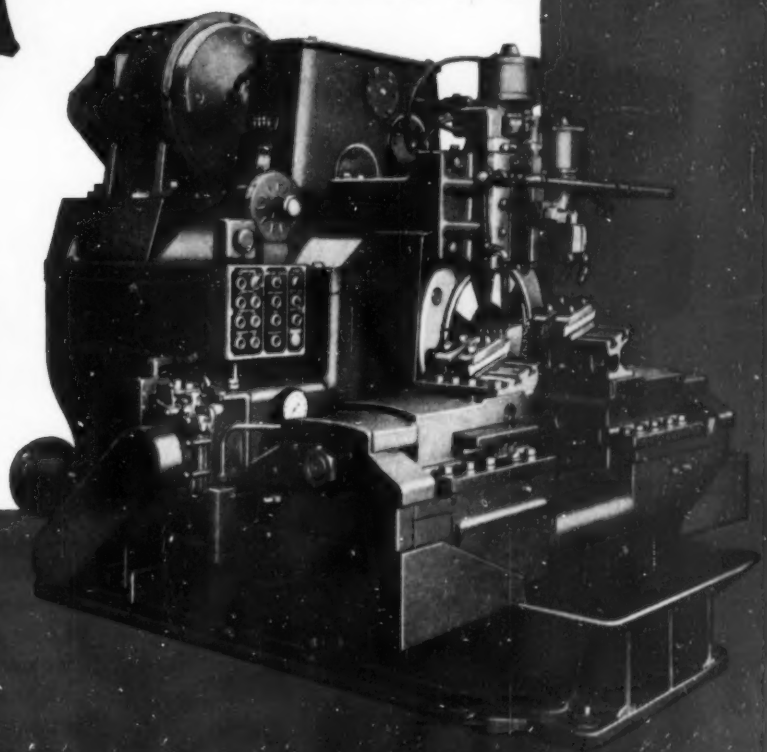
Loading Tables
(All Sizes)

Automatic loading of the Cutting-off Lathes greatly reduces the cost of machining coupling blanks, nipple blanks and many similar parts made from tubing or pipe. The loading table has capacity for an average bundle of pipe or tubing. By using these automatic tables it is often possible for one man to operate two Cutting-off Lathes.



No. 32
(2 inch capacity)

Nos. 314 and 316
(14 and 16 inch capacity)



Write for complete information on the most complete line of cutting-off lathes ever offered. (Please specify size and nature of your work.)

Here's another reason it pays to get a proposal from Fosdick

We put a table on the

When Fosdick engineers put a table on the radial, a unique and basic machine tool was born. This machine combines the best features of two proven, reliable designs. It gives you the capacity and flexibility of a radial—the rigidity, compactness and convenience of an upright. It's the machine you need when you want versatility and economy in limited floor space.

The arm of the Sensitive Radial swings 360° on the rigid one-piece column. Controls are always at the same convenient height. Work is placed on the adjustable table, *or* on the base with the table swung out of the way. Drills up to 1½". 12" column, 3' or 4' arm, nine speeds, four feeds, 3 hp motor, reversing motor control for tapping.

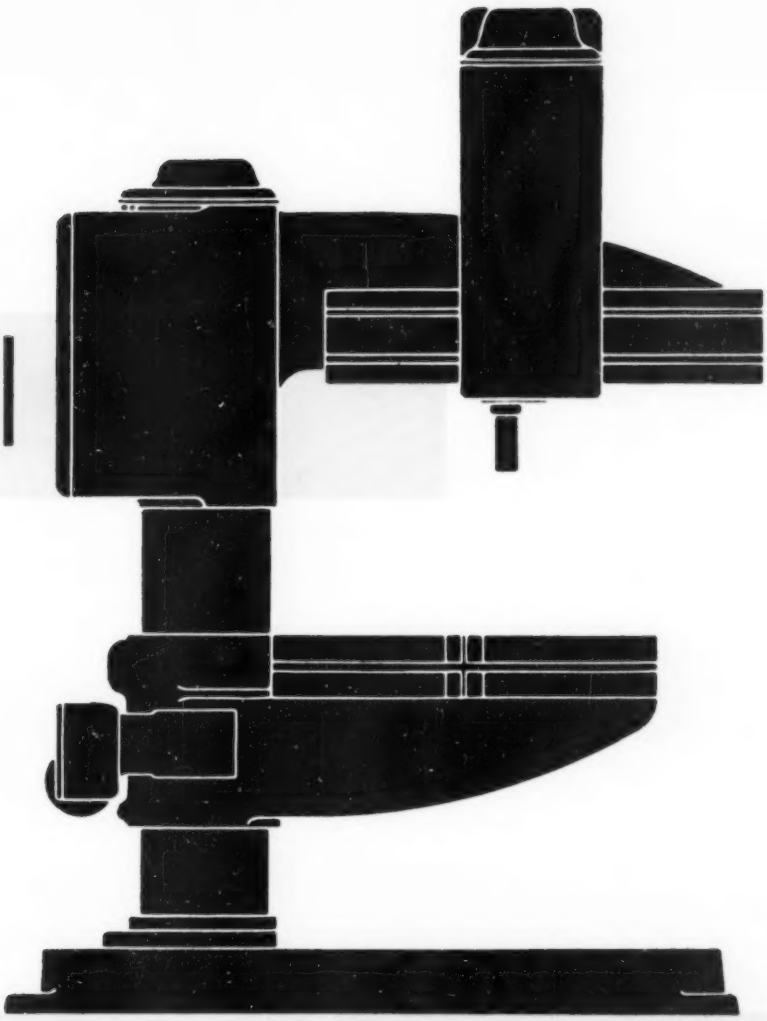
For full information on the Sensitive Radial, ask for Bulletin SRA

to give you

Variety problem solved at Lodge & Shipley

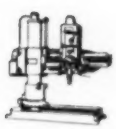
Building 46 lathe models from 14" to 60" requires plenty of production versatility. To drill and tap a broad variety of vari-shaped parts, *Fosdick's proposal* recommended the Sensitive Radial. Now Lodge & Shipley assigns tool blocks, levers, cam plates, spindles and many more complex parts to their Fosdick, knowing it will produce fast and easily. *Operation illustrated:* Tailstock spindle clamped to table vee. Drill, chamfer and tap 4 holes. 17/64" drill, 1020 rpm, .004 ipr, 7/8" deep. Chamfer, 1020 rpm. Tap 5/16" x 18 thread using Automatic Tapping Control (extra equipment), 240 rpm, 1/2" deep.

radial



versatile production like this

Need Drilling Equipment? Get a Proposal from Fosdick!



Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

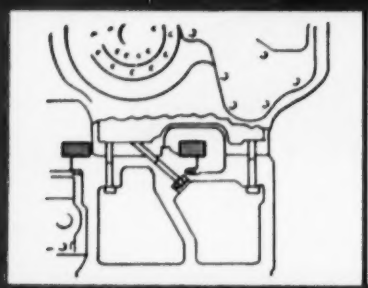
Automatic Positioning Machines

FOSDICK

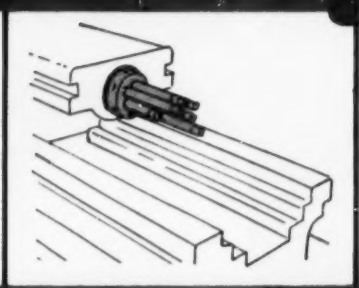
THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

another reason why J&L turret lathes produce

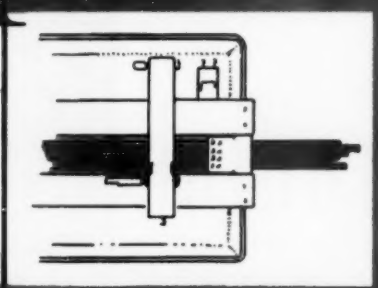
MORE CHIPS PER TOOL
MORE PIECES PER HOUR
MORE PROFIT PER JOB

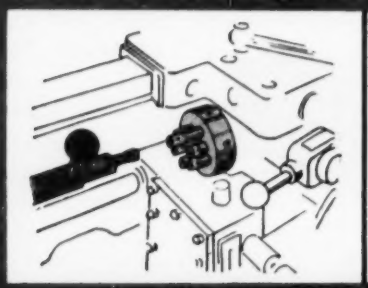


Headstock, solid one-piece casting—extra heavy sections. Wide stable bed. Hardened and ground steel ways.

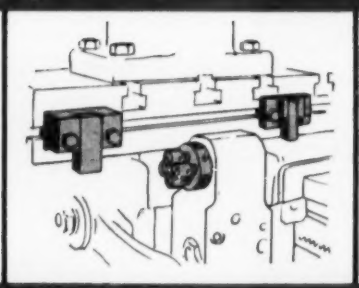


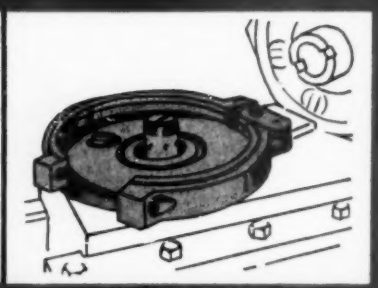
Positive, accurate stops for hexagon turret.





Positive accurate stops for carriage and cross slide.





Accurate, positive turret indexing.

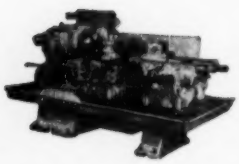
MORE ACCURACY!

The headstock is cast separately in one piece, with extra heavy sections to dissipate heat and minimize distortions. Bed is a heavy sectioned casting, with shoulders the full length for accurate alignment of the ways with the headstock.

The replaceable hardened solid steel ways are precision ground—parallelism is held to .0003 in both width and thickness, their entire length. All cuts (within rated capacity) taken on or between bedways.

All feeds are disengaged against easily set *positive* stops, through *positive* metal-to-metal contact.

Turret rotates on hardened, ground and lapped center pin—bearing surfaces are hand scraped. Locking pin and bushing provide solid, flat abutments with maximum contact area.



P.S. These machines will pay for themselves quickly through savings in direct costs alone. Write to Dept. 710 for Catalog.

"World's most accurate and powerful turret lathes"

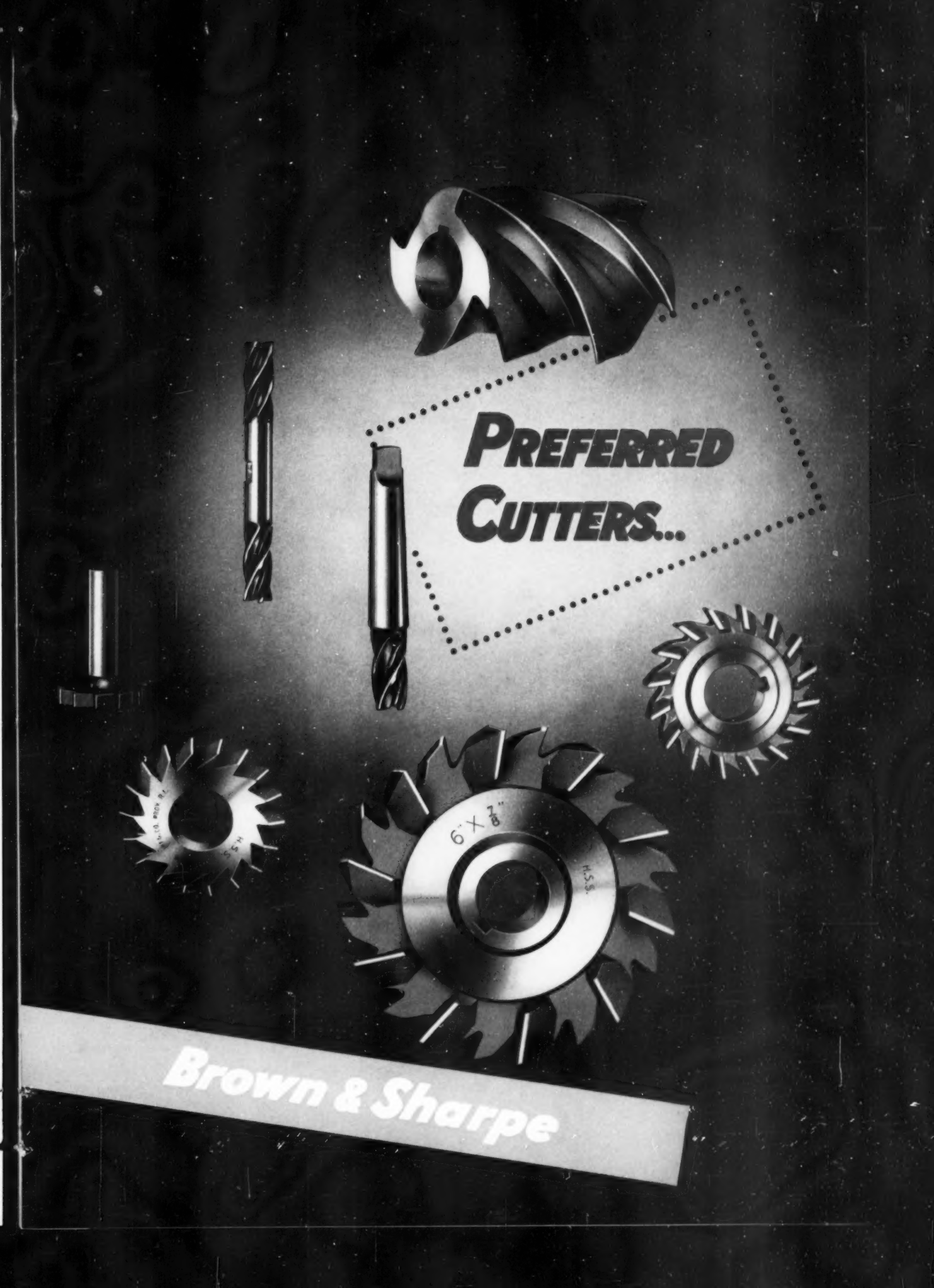
RAM TYPES: Bar, 1⅛" to 4½", Chuck, 10" to 12". SADDLE TYPES: Bar, 2½" to 5", Chuck, 12" to 18".

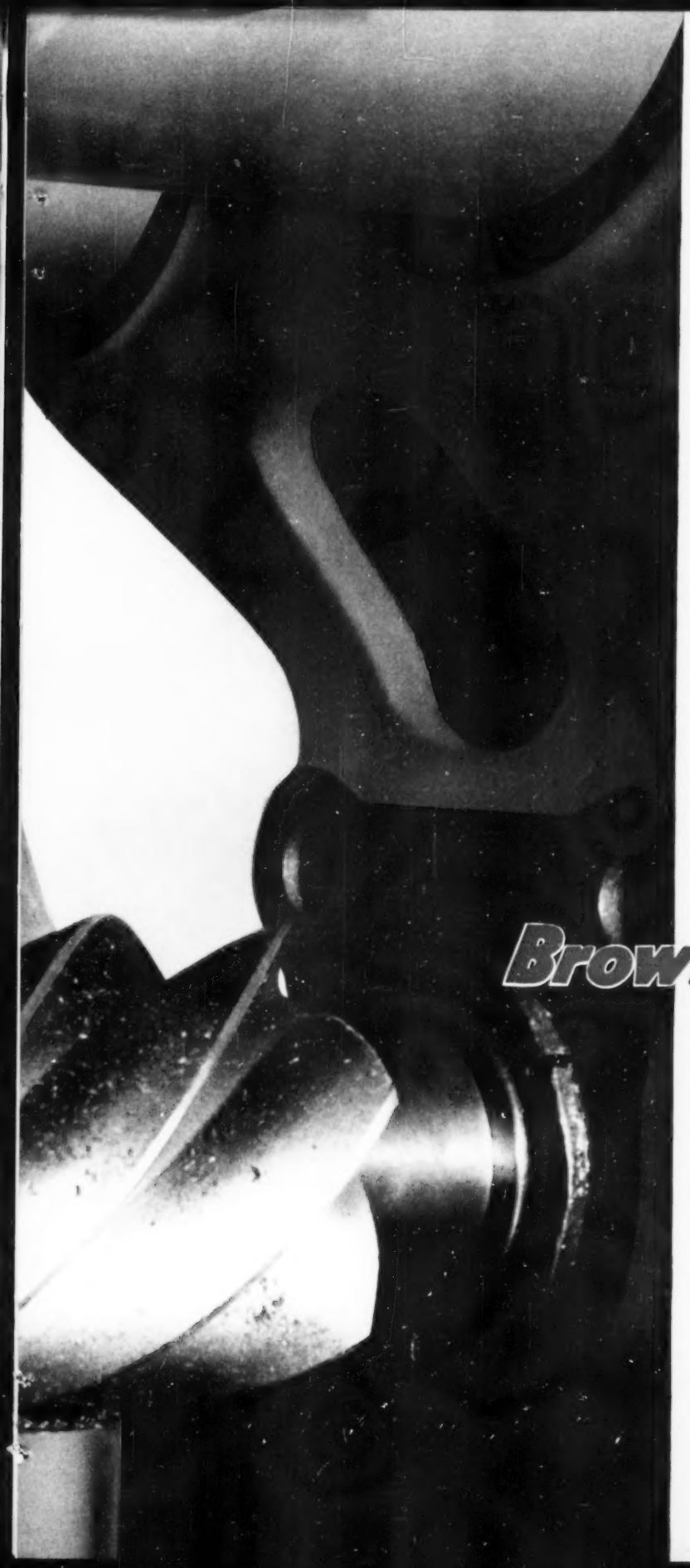
JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L TURRET LATHE DIV.


PREFERRED
CUTTERS...
Brown & Sharpe



Preferred by Craftsmen for Quality . . .

Preferred by Management for Economy . . .

Two recent "Brand Preference" studies — independently made by reliable organizations — indicate an obvious preference for Brown & Sharpe Cutters among both large and small users of milling cutters.

There are obvious reasons for this preference, too. Management, production, and purchasing men know from experience that Brown & Sharpe Cutters are made to one uniformly high standard of quality . . . that they cut free and clean, wear longer, and assure the lowest possible *real* cutter cost.

Therefore, when you order cutters, why not get *the most* for your money . . . specify Brown & Sharpe Cutters. They're available in the widest variety of types and sizes.

Brown & Sharpe

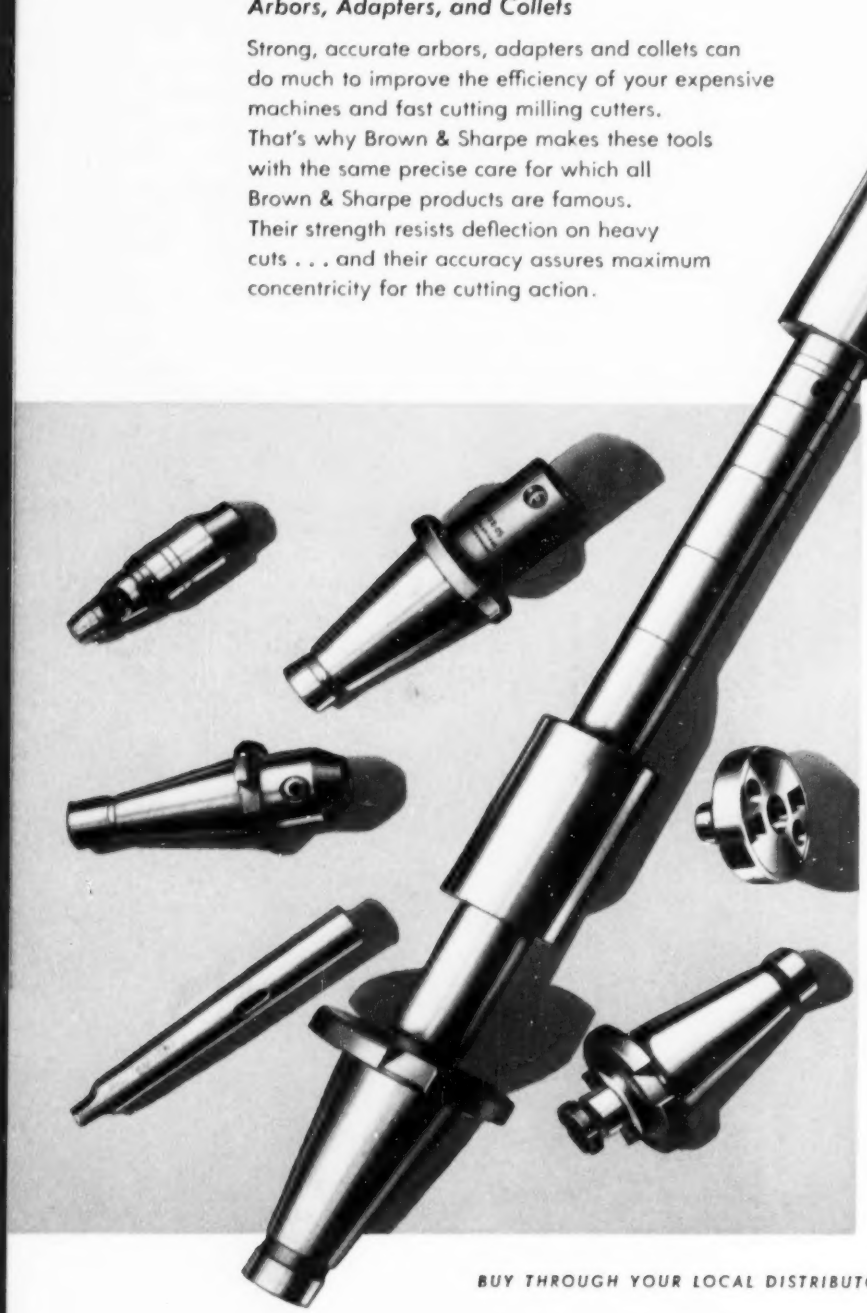
Angular Cutters
Convex and Concave Cutters
Corner Rounding Cutters
End Mills
Gear Cutters and Hobs
Ground Formed Cutters
Inserted Tooth Cutters
Key Seat Cutters
Metal Slitting Saws
Plain and Helical Milling Cutters
Rotary Shears
Screw Slotting Cutters
Shell End Mills
Side and Half Side Milling Cutters
Sprocket Wheel Cutters
Staggered Tooth Cutters
T-Slot Cutters

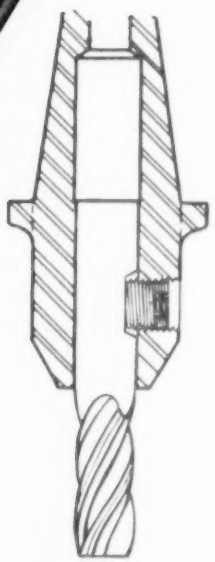
BUY THROUGH YOUR LOCAL DISTRIBUTOR

Important contributors to highest milling efficiency

Arbors, Adapters, and Collets

Strong, accurate arbors, adapters and collets can do much to improve the efficiency of your expensive machines and fast cutting milling cutters. That's why Brown & Sharpe makes these tools with the same precise care for which all Brown & Sharpe products are famous. Their strength resists deflection on heavy cuts . . . and their accuracy assures maximum concentricity for the cutting action.





Cutter Adapters for Straight Shank End Mills

Many Brown & Sharpe Adapters incorporate this "quick-set", "quick-release" method for holding single- and double-end end mills. Safety Set Screw holds shank of cutter securely . . . a quick turn of a wrench locks or releases end mill. Long, straight bearing surface assures concentric cutting.

Write for the new Catalog 35C which describes in detail the complete line of Brown & Sharpe Cutters, Hobs, Arbors, Adapters, and Collets.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe

Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories
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BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U. S. A.

PRINTED IN U. S. A.

WHY IT PAYS TO BUY STEEL FROM WAREHOUSE

You don't get caught with steel you can't use!

WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

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- LOWER SPACE COSTS
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- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

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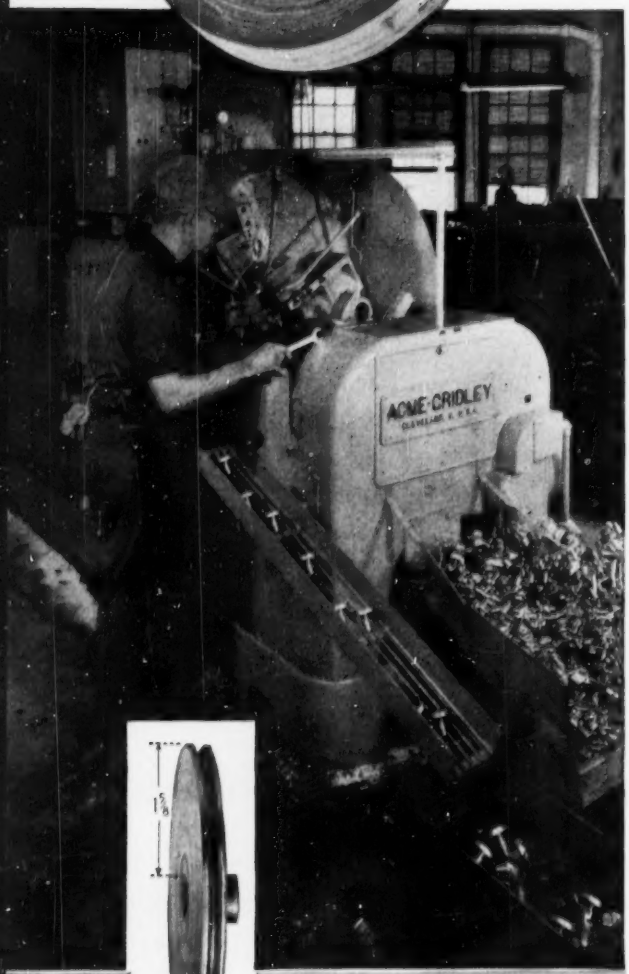
Warehouses and Sales Offices Coast to Coast

UNITED STATES STEEL

YOU CAN SAVE—plenty



You'll say it's better machining practice to break up chips and right you are. This one, 58 ft. long, on difficult material, to the full depth of a deep forming cut, was made during the set up. It serves to demonstrate a new kind of machine *stability and performance* which forward looking buyers demand and get in the—

New Model "M"

ACME-GRIDLEY

Single Spindle Bar Automatic

In short, it demonstrates important design and construction features such as frame weight and balance, heavy slides, powerful uniform cam feeds that minimize vibration and increase tool life even at fastest feeds and speeds that modern carbide tools can take—all of which guarantees sustained accuracy, long machine life, lower costs.

Other Acme-Gridley features that promote adaptability and speed on all classes of work—

- ★ *Eight independently operated tool slides*
- ★ *Three automatically selective spindle speed ranges*
- ★ *Independent turret indexing permits overlapping operations*
- ★ *Accessible tools and camming—easy operation, quick change-over on short runs. One man runs 2 or more machines*
- ★ *Time cycle for job is fully automatic—production schedules can be predetermined and met—saving plenty!*

Ask for Bulletin M-50A

JOB FACTS

PIECE: Motor Valve Plate
SIZE: 3¼" diam.
MATERIAL: E 52100 Ball Bearing Steel
HIGH SPEED TOOLS: 13 are used including trepaning face and drilling hub
MACHINE TIME: 17 min. 50 sec.
MACHINE: 5¼" Acme-Gridley Single Spindle Bar Automatic

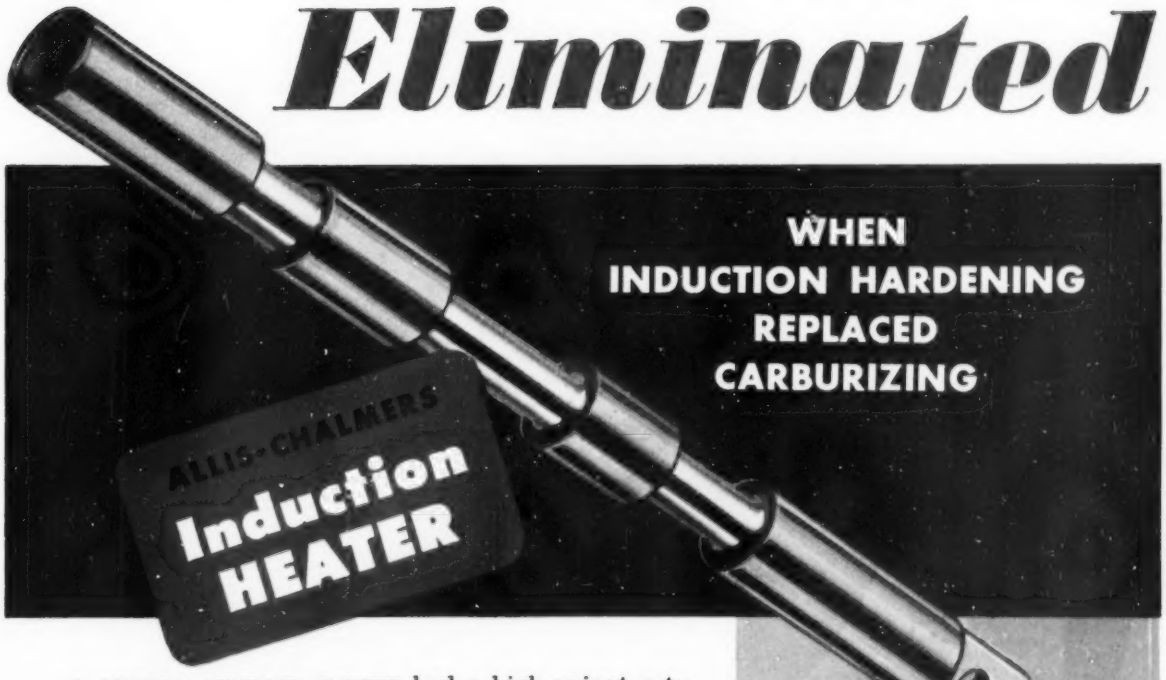
Remember—**industry can't do TODAY'S JOB with YESTERDAY'S TOOLS and be in business TOMORROW**

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics, 1-4-6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing.

Rejects Eliminated



WHEN INDUCTION HARDENING REPLACED CARBURIZING

A LEADING AIRCRAFT BUILDER had a high reject rate while carburizing hydraulic control valves. In addition, production was slow. Rework after rework was necessary because material was brittle and straightening was difficult, if not impossible. Depth of carburization was also hard to control . . . and it was a dirty job, too!

Picture Changed Overnight

Now, with Allis-Chalmers induction heaters rejects or reworks are eliminated; depth of hardening is held between .078 inches and .080 inches; production is greatly increased; and it's a clean, pushbutton type job.

Where there's a problem with warpage, scaling, or heat control, even a relatively low production item can often be profitably processed using induction heat.

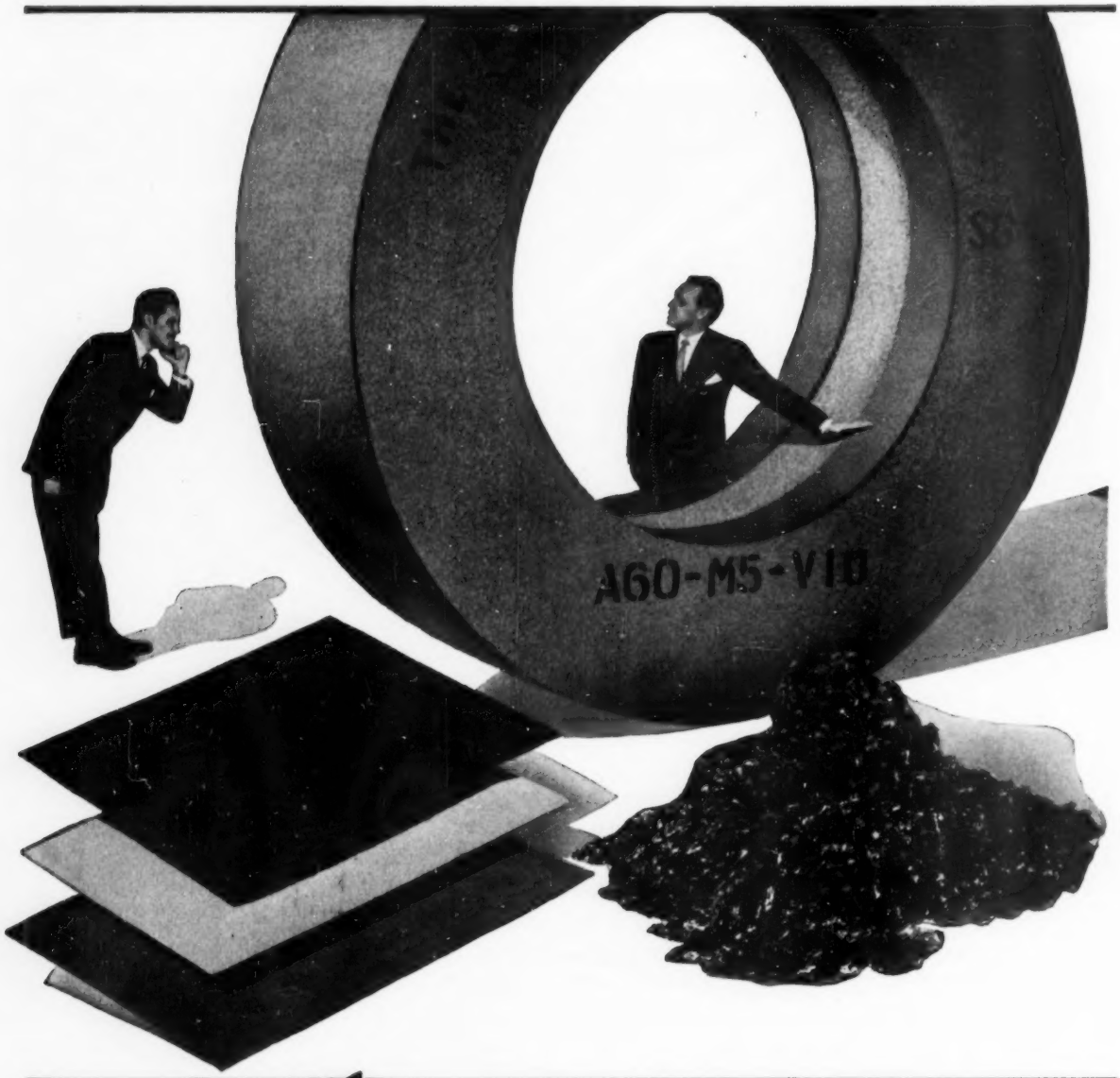
Bring your problems to Allis-Chalmers. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4169

ALLIS-CHALMERS

See Allis-Chalmers Induction Heater in Operation at the National Metal Exposition and Congress, Oct. 19-23, Booth 2621, Cleveland, Ohio

What's BEST FOR



CARBO

TRADE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, New York

YOU is BEST for us!

You get UNBIASED COUNSEL based on all abrasive methods

Your business, in mass production of parts or finished assemblies, is the problem of generating close tolerance sizes, of producing high surface finishes, of removing stock. The business of CARBORUNDUM is the exclusive ability to recommend and furnish you the specific type of abrasive product which will give you highest quality at lowest cost, on every operation you perform.

Take surfacing, for instance. There are at least 11 different methods of grinding plane or flat surfaces with abrasives. Is your present method the best—the most economical? How can you be sure? Ask CARBORUNDUM . . . for CARBORUNDUM alone has a complete branded line of grinding wheels *and* coated abrasives *and* tumbling and polishing grains. Only CARBORUNDUM can recommend without bias, on the sole basis of what's best for you.

Or perhaps you manufacture table glassware. You can engrave the decorations with a grinding wheel—or you can etch them with high-velocity abrasive grain. You can finish the edges with abrasive belts, or with a grinding wheel. Whatever your method, CARBORUNDUM alone can supply *all* the abrasives you need with *one-source control* of quality . . . quality that's constant, identical, dependable—thus economical.

Several ways to do one operation? Call in CARBORUNDUM. Several processes on one part? Call in CARBORUNDUM. Either way, you win.

Call your CARBORUNDUM *Salesman or Distributor* today!

He's your best bet for complete stocks, prompt delivery . . . and best of all, experienced counsel on *every* new development in the *entire* field of abrasives. He's in the yellow pages under "Abrasives" or "Grinding Wheels." Phone him today—it's to your profit!

Ready now—your free copy of the new big COATED ABRASIVE SELECTOR catalog . . . containing detailed recommendations for both machine and hand sanding operations on tough and soft metals, glass, plastic, wood. Phone for it today.

RUNDUM

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. . . the ONLY source for EVERY abrasive product you need

HELP WANTED

Manufacturing plant needs precision surface grinder capable of high speed for increased production. Qualifications must include: accuracy, flexibility of operation, easy and low-cost maintenance plus durability and long life. References of past experience must be furnished.

here's your answer

Covel Surface Grinders are fully qualified to meet these requirements and are ready to start working for you NOW. Covel has built precision grinders since 1874. Our thousands of satisfied users are your assurance of dependable service and top performance.

QUALIFYING FEATURES

Hydraulic Feed—low-pressure hydraulic system used throughout. Pilot valve gives smooth reversal at high speed. Table speed from 10 to 90 ft. per minute.

Sealed-for-life Spindle requires no lubrication—keeps out grit.

Grinding Wheel Truing Device mounted on vertical slide. Enables wheel to be dressed without removing work from chuck on production grinding. Saves valuable time.

Anti-Friction Ball or Roller Bearings used throughout.

Hard chrome table ways for extra long life.

Hardened and ground cross feed and elevating screws.

TWO SIZES:	No. 20	No. 35
Work capacity	6″ x 18″	8″ x 24″
Transverse table travel	6¾″	9″
Longitudinal table travel	20″	27″
Grinding wheel size	10″	12″
Capacity under wheel	12″	11″

Write for BULLETIN AM-113

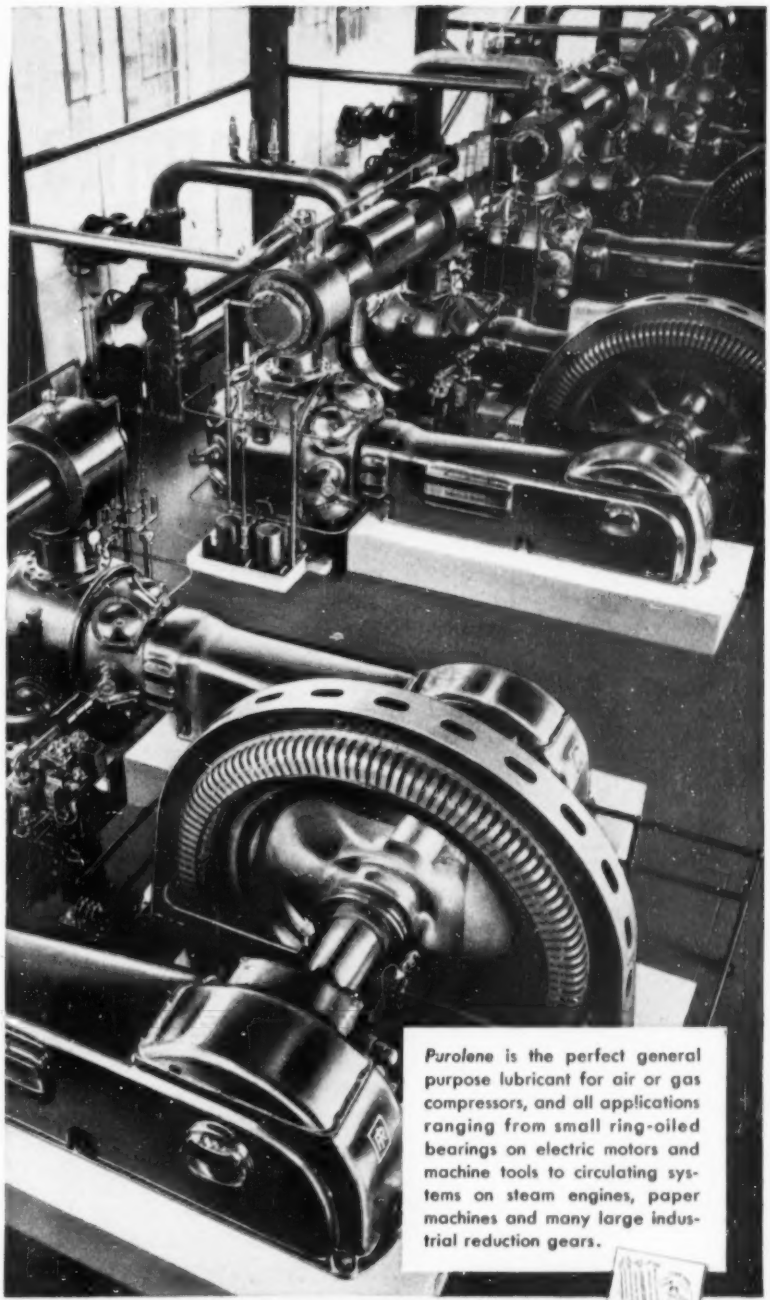
COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTERS & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

The Oil That Says:

"CAN DO!"



Purolene is the perfect general purpose lubricant for air or gas compressors, and all applications ranging from small ring-oiled bearings on electric motors and machine tools to circulating systems on steam engines, paper machines and many large industrial reduction gears.

High V. I. PUROLEN proves perfect in hundreds of uses

The *qualities* built into Purolene are what give it such a broad, multi-purpose usefulness.

Expertly refined from a superior paraffin crude, Purolene has 100 plus V.I., high flash and fire, low pour, high resistance to oxidation and offers protection against rust.

Purolene is one of a group of Pure Oil *multi-purpose* industrial lubricants, each designed to do many different jobs equally well. You can use them to simplify your lubrication practice and reduce your lubricants inventory.

So effective is the multi-purpose character of the lubricants in this group that *seldom more than six are needed to do the entire lubrication job for even a large plant!*

Learn how to use this versatile line to start a new labor-saving, money-saving lubrication program in your plant. Use the coupon below.

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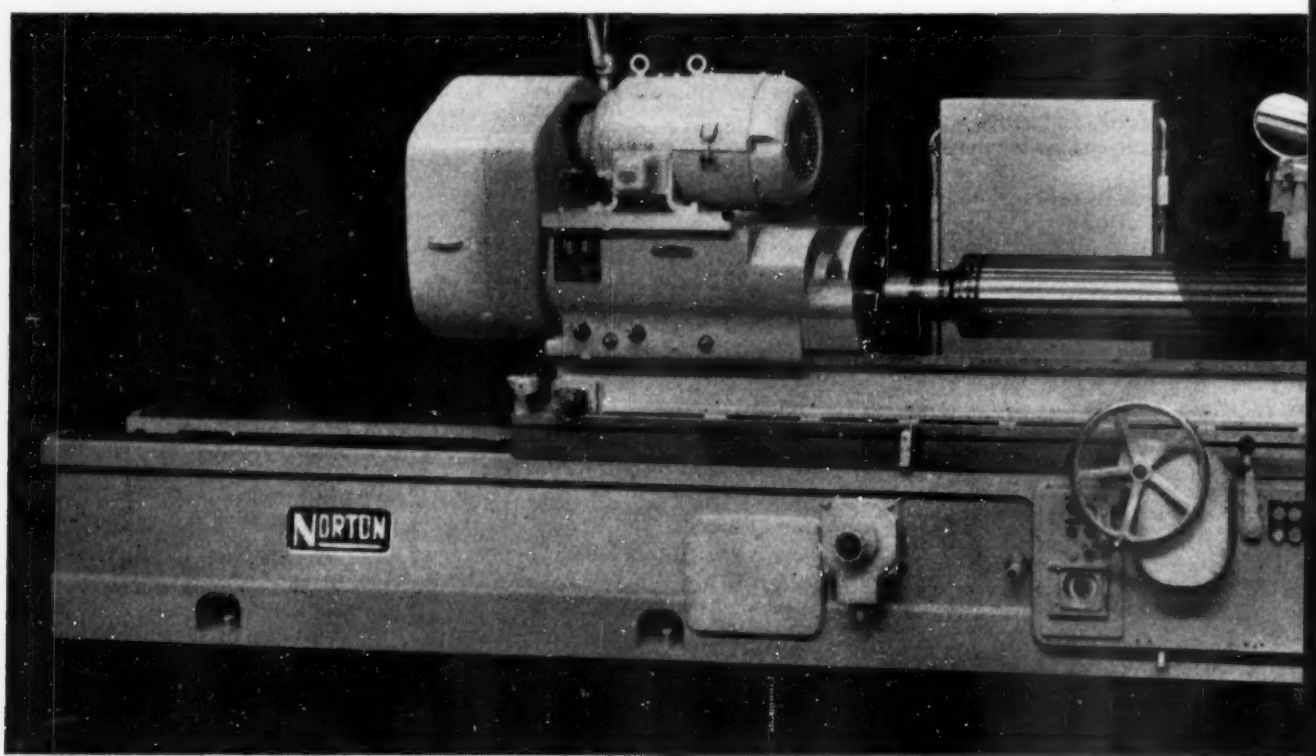
You get bigger profits...the real

"TOUCH OF GOLD"

with the new Norton C-2 cylindrical grinder

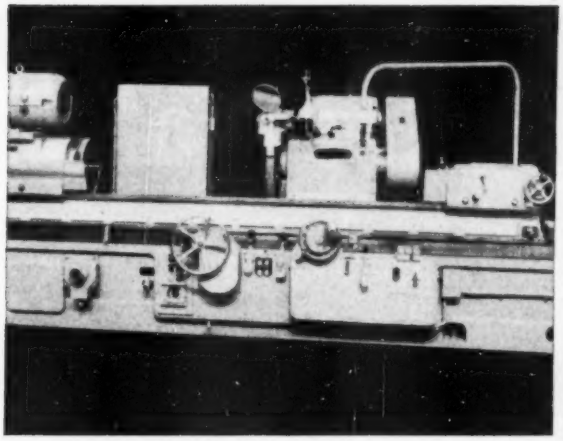


Faster cutting . . . quicker set-up . . . easier operation

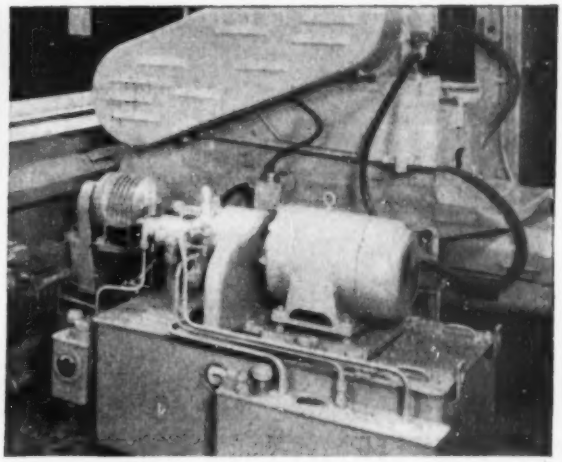
This is the kind of grinding machine you expect from Norton — one that's tops for accuracy, production rate and ease of operation.

The new C-2 gives you more heavy production because it works more of the time — and works faster and easier. When used as a semiautomatic all your operator does is set it up and push the button for automatic grinding to exact size and finish.

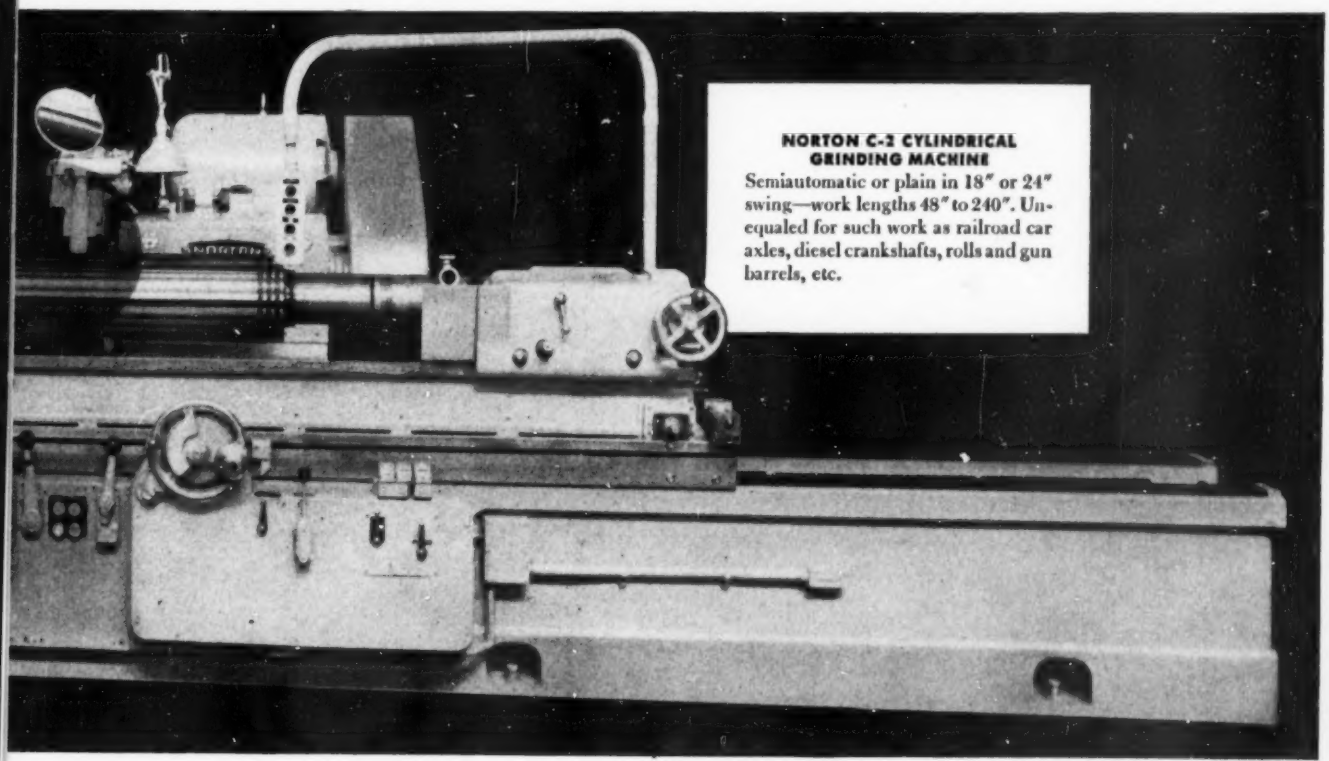
Remember, only Norton offers you such long experience in both grinding wheels and machines — assuring you the



EASY TO SET UP AND OPERATE. All controls in front for minimum set-up time, quick change-over and no reaching by operator. Graduated feed hand wheel indicates feed. "Click-counter" signals each .0001" reduction in work diameter. Table-truing and grinding speeds may be pre-set, and obtained by selector lever.



EASY TO MAINTAIN. All maintenance points on outside. Pumps, motors, filters, lubrication valves and all reservoirs easily accessible. Electrical controls grouped for easy inspection and enclosed for protection.



NORTON C-2 CYLINDRICAL GRINDING MACHINE

Semiautomatic or plain in 18" or 24" swing—work lengths 48" to 240". Unequaled for such work as railroad car axles, diesel crankshafts, rolls and gun barrels, etc.

. . . less down-time

value-adding, "Touch of Gold" that means more and better products for less cost.

Get ALL The Facts. Your Norton Representative will be glad to give you further details on the new C-2, and to discuss your grinding problems or, write direct to NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With **NEW**

NORTON

GRINDERS *and* LAPPERS

Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
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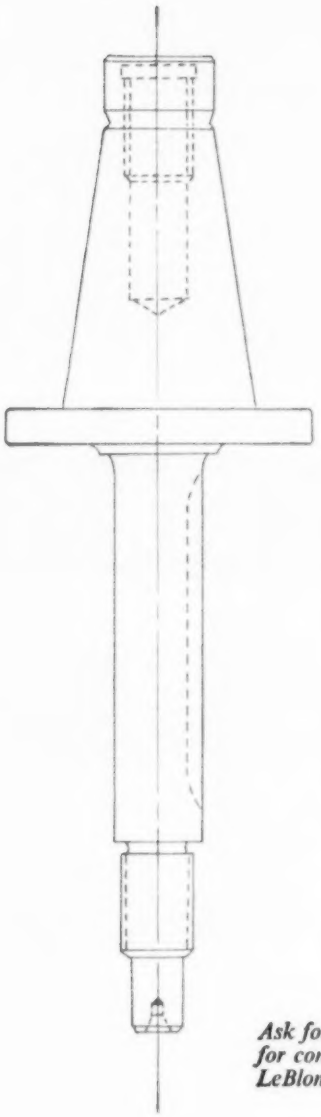
NOW SCULLY-JONES TURNS

four arbors instead of 3...

Hydra-Trace (Trade-Mark Registered U.S. Pat. Off.) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935.

same time, same lathe...

plus "Hydra-trace"*



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. *Fits all LeBlond Engine Lathes built since 1935*, can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

Call your nearby LeBlond Distributor or write—

Ask for Bulletin HT2A for complete details on LeBlond Hydra-Trace.

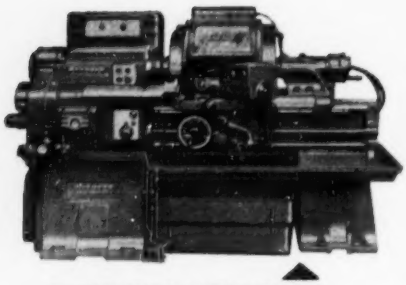
turned faster by

LeBLOND *of Cincinnati*

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

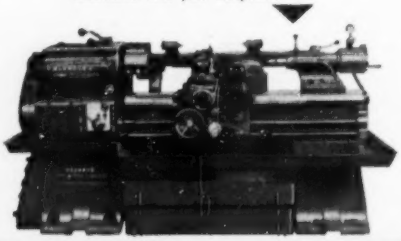
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 65 YEARS*

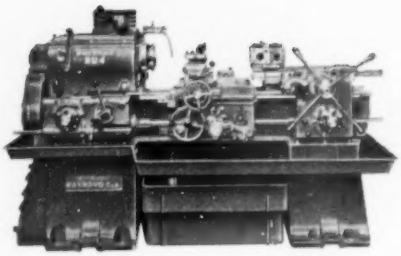
The entire line of Maxnovo machines is manufactured by one of Europe's most advanced manufacturers in this line. These machines can be furnished with many types of special attachments and tools too numerous to describe here.



MAXNOVO MODEL A AUTOMATIC CYCLE "PROFILMATIC" DUPLICATING LATHE. 17" swing over ways, 4½" over cross slide with 20", 30" or 40" center distance. This machine is equipped with air chuck and air tailstock to provide a completely automatic cycle with 2 or 3 automatic spindle speed changes and 6 or 12 automatic feed changes. Automatic speed and feed changes are accomplished by an automatic cycle control bar which is pre-set to operate precision microswitches at any point of the operating cycle. Copies from master template mounted at rear of machine out of the way of chips and coolant. 12½ or 15 H.P. drive. This machine can be furnished with complete tooling to produce parts in accordance with your blueprint.

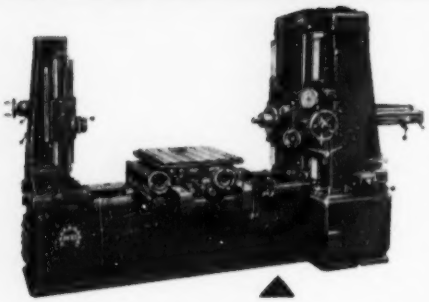
MAXNOVO MODEL U UNIVERSAL "PROFILMATIC" DUPLICATING LATHE. Swing over ways 17". Maximum turning dia. over cross slide 4". Distance between centers 30", 40", or 50". 6 or 12 spindle speeds from 75-1400 R.P.M. This machine duplicates automatically from either a sample work piece or from a flat template. The sensitive electro hydraulic tracing unit duplicates within extremely close tolerances. The duplicating slide can be locked out to permit use of the machine as a conventional lathe. 8 or 12 H.P. motor drive. This machine can be furnished complete with tooling to machine parts in accordance with your blueprints.





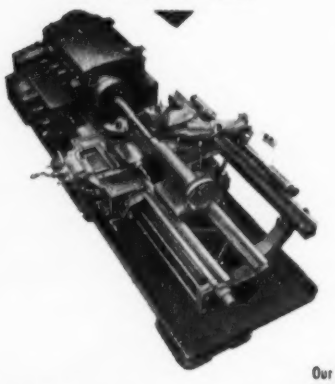
MAXNOVO MODEL RU 4 UNIVERSAL TURRET LATHE. Swing over bed 16-9/16". Swing over cross slide 9⅞" Capacity through spindle 2". Maximum distance spindle nose to face of turret 29½". Spindle speeds 64-1200 R.P.M. 8 power feeds to carriage .002"-.024" per rev. and 32 power feeds to turret .0005"-.048". 8 or 12 H.P. motor drive. Machine can be furnished with air chuck, collet chuck, or bar feed attachment. The hexagon turret faces are machined and tapped to American standards and will accept standard turret tools of leading American manufacturers of this type of machine.

SEE THESE MACHINES



DIXI 60 COMBINATION HORIZONTAL BORING MILL AND JIG BORER WITH OPTICAL MICROSCOPES. Headstock, column, table settings accomplished by optical microscopes to insure overall accuracy of .0002". Built in rotary table also equipped with optical microscope for accurate angular settings. Table size 28¾" x 32⅝". Maximum distance table to spindle 19.7". Table travel longitudinal and traverse – 23⅝". Hydraulic feeds for all functions 0- 78" per min. #40 mm Taper spindle. Spindle travel 24.4". Spindle speeds 32-1350 R.P.M. Spindle feeds .0015"-.010" per rev.

SCHAERER MODEL UN-450 HEAVY DUTY COPYING LATHES. Twin cross slides. Copies from cylindrical or flat template either longitudinally or cross. Twin slides permits rough turning and finish turning in the same operation in many instances. Swings 17¾" over bed, 9" over carriage, 20-5/64" over gap. Center distance 60". Spindle speeds 31.5 to 1400 R.P.M. Hydraulic copying attachment can be removed to permit use as a regular twin slide lathe when necessary. 10 H.P. motor drive to spindle. Separate motors for coolant and hydraulic pick up. A production lathe built to tool room standards.



GIRARDS RADIAL DRILLS. Seven Sizes from 3' arm x 11¾" column to 10' arm x 25½" column. 3' and 4' arm machines have 12 spindle speeds from 32-1400 R.P.M. and 6 feeds from .0015" to .040" with #4MT Spindles. Larger machines have 21 spindle speeds from 14-1400 R.P.M. and 12 feeds from .0008" to .080" with #5MT Spindle and 7.5 H.P. Spindle Motor.

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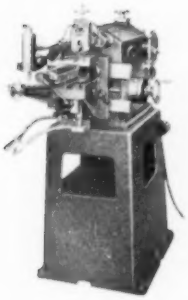
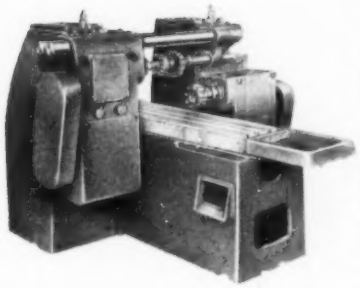
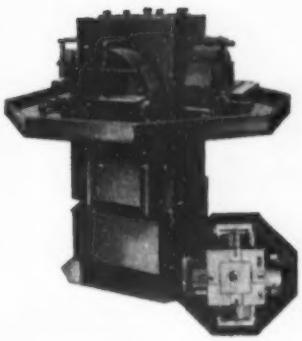


BARTSCH HYDRAULIC COPYING SHAPER. 8" Stroke, 8½" cross travel, 6" vertical travel. Ram speed infinitely variable 0-65 ft. per min. Copies any shape from template at 1:1 ratio. Automatic table feed. Stroke length adjustable. Indexing vise permits shaping work between centers. 2 H.P. motor drive.

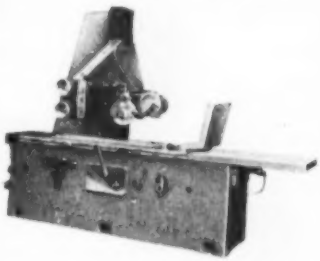


OLIVETTI MODEL FP4 PRODUCTION TYPE MILLING MACHINES. Available with 20", 40", or 72" Table Travel in **simplex, duplex,** and **triplex** machines. Machines arranged for conventional or climb milling. Cutter spindle motors up to 10 H.P. Machines heavily constructed for production work. Automatic work cycle permits rapid advance, feed, and rapid return. Table width 12". 13 feeds to 32" per min. Rapid traverse 173" per min. 12 spindle speeds 63 - 800 R.P.M.

QUART CARBIDE TOOL GRINDER. 4 working positions. Three 12" silicon carbide cup wheels and one 14" straight wheel. Individual direct motor drive and separate control switch for each working position. Wheel speed 1750 R. P. M. Provision for diamond dressing tool at each working position. MODEL TRIAX (not shown) same as above, but with 3 cup wheels and 3 working positions only.



SCHNEIDER HYDRAULIC UNIVERSAL HORIZONTAL SURFACE GRINDING MACHINE TYPE JoH2. Grinding spindle adjustable through any angle from 0° to 90°. MODEL JoH1, 24" x 10" Table, 18" Under Wheel. MODEL JoH2, 48" x 16" Table, 22" Under Wheel. MODEL JoH3, 60" x 20" Table, 22" Under Wheel. Table feed infinitely variable 0-50 ft. per min. Traverse feed infinitely variable 0-.600".



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Capacities from #0 to 1¼"

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Capacities from #8 to 4¼"

TANGENT CHASER TYPES
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Some of the reasons why:

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THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

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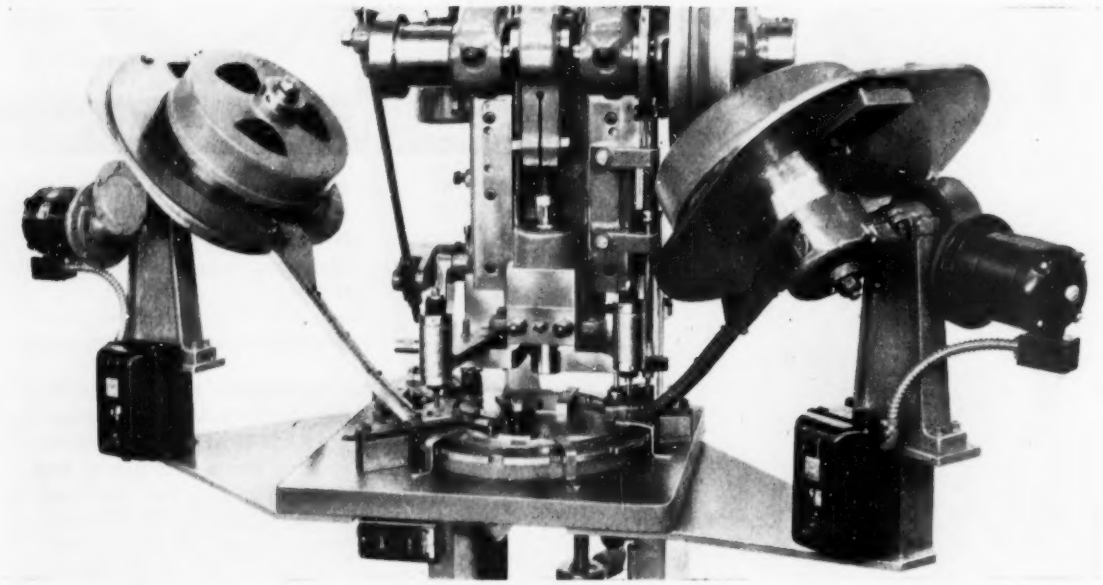
DIE HEAD DIVISION

When you run V & O long slide presses you can inspect an occasional few of your stampings and be sure that the others are exactly like them. And when you can do that, when your machines operate with such consistent precision that random or chance imprecisions are statistically unlikely, then you have quality control.

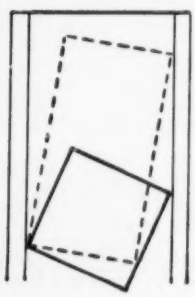
FOR QUALITY CONTROL GO V&O



V & O long slide press that automatically feeds and assembles two parts from their individual hoppers, 128 strokes a minute.

INVITATION TO INGENUITY

V & O long slide design provides space for precision-promoting tooling. Ingenious design can apply moving and stationary members that make random operating imprecisions statistically unlikely.



THE LONG SLIDE PRINCIPLE

eliminates the random imprecisions that can come from stroke misalignments.

The longer the slide the less can be the angular misalignment.

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

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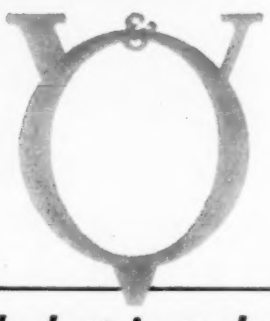
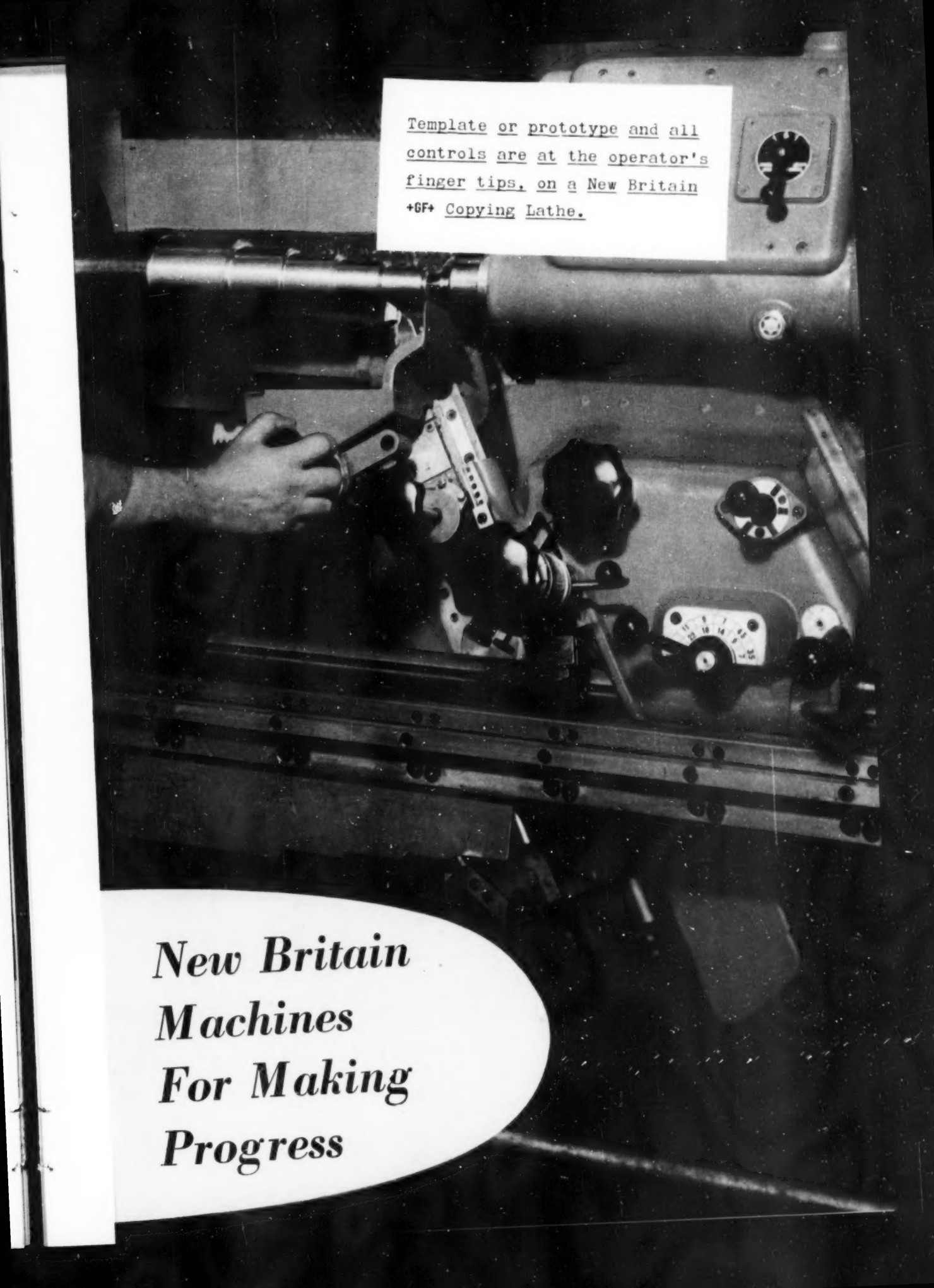
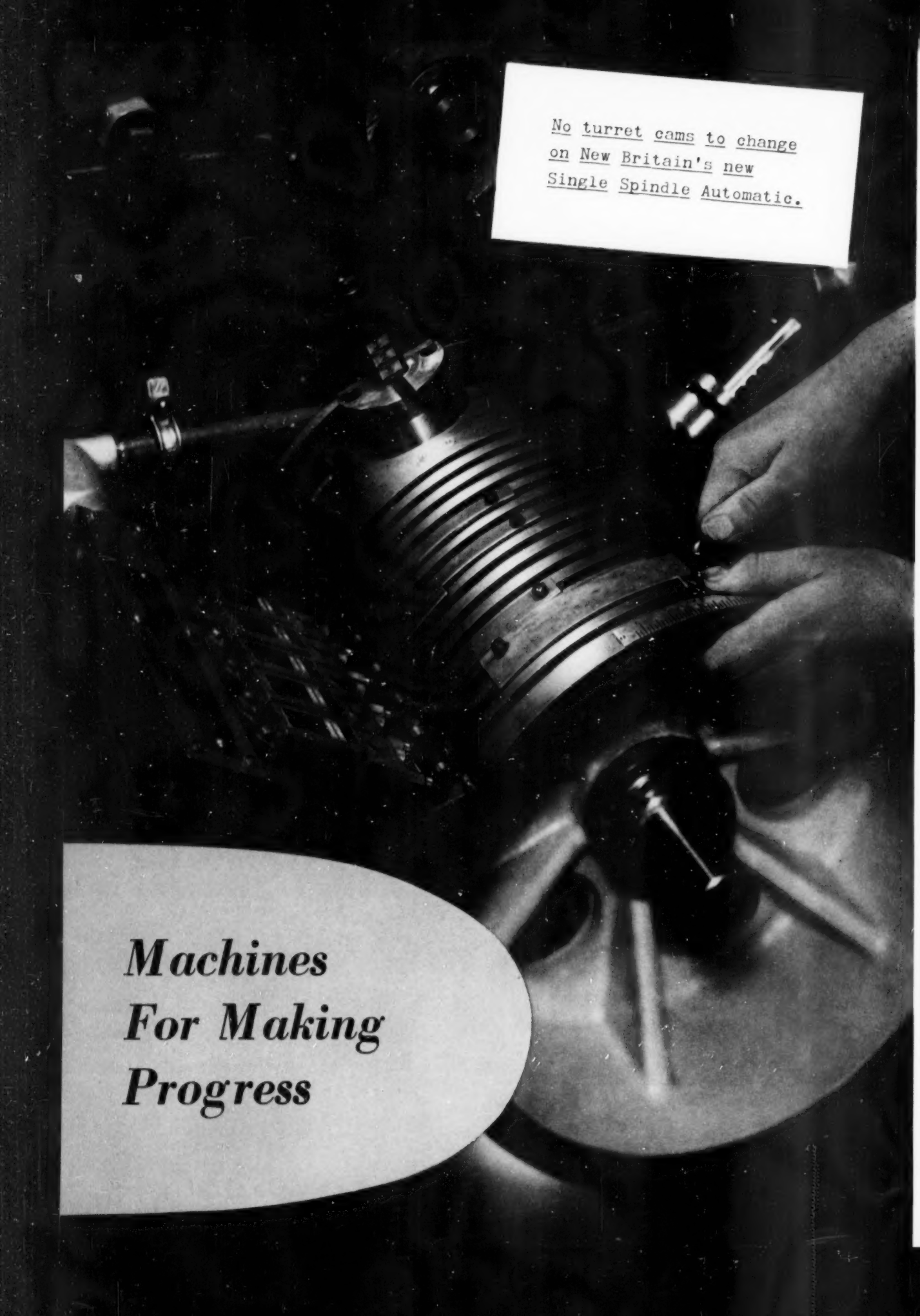
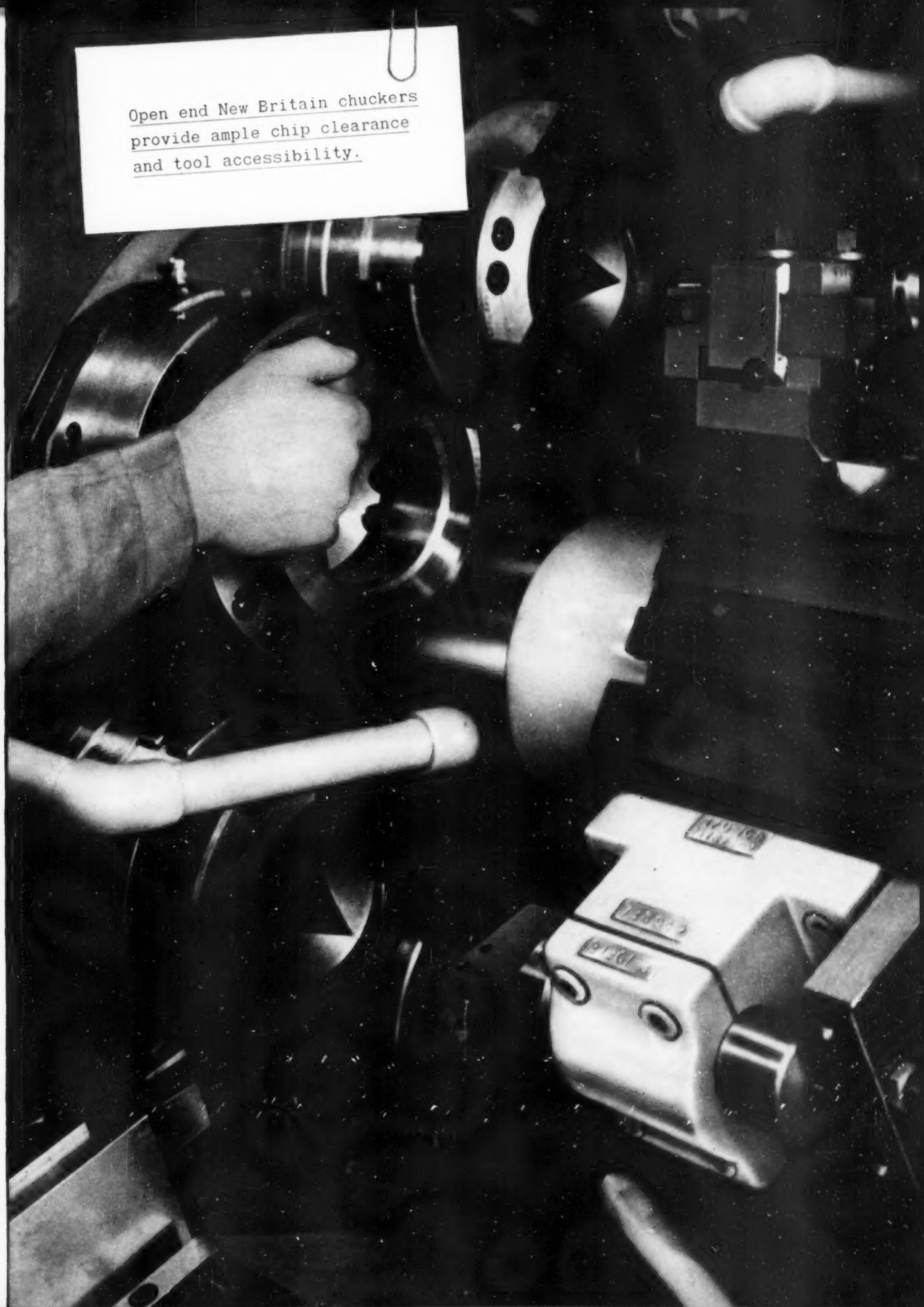
BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889



Only the best is good enough


Template or prototype and all controls are at the operator's finger tips, on a New Britain +GF+ Copying Lathe.
New Britain
Machines
For Making
Progress

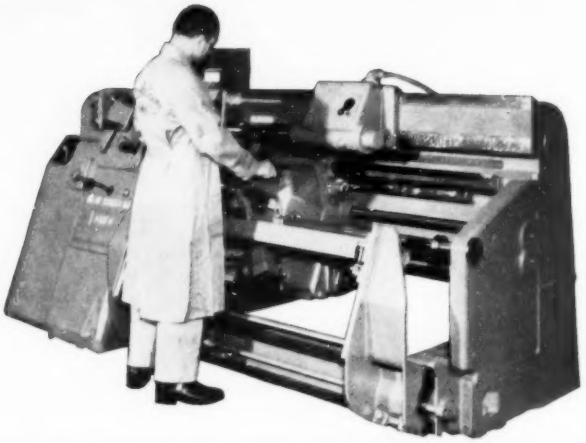

No turret cams to change
on New Britain's new
Single Spindle Automatic.
Machines
For Making
Progress



Open end New Britain chuckers provide ample chip clearance and tool accessibility.

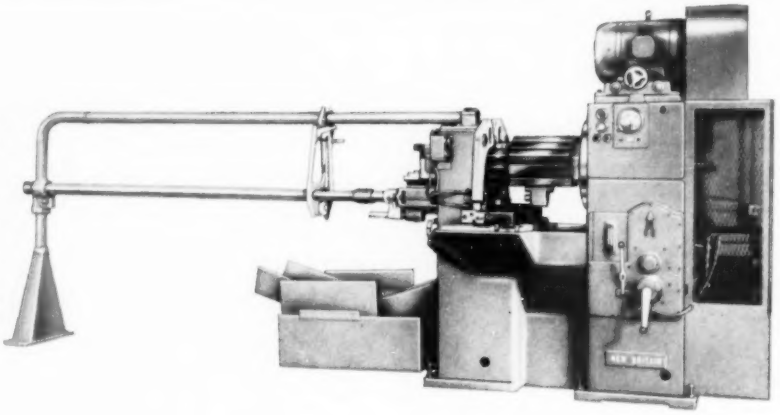
New Britain +GF+ Copying Lathe

Built on a new principle, with copying saddle mounted below the spindle and no conventional bed to accumulate chips which fall free and accumulate through the back of the machine. Every control is at the operator's finger tips. Template or prototype is also on operator's side. Powerful drive and a wide range of speed and feed ranges make it a profitable producer on short or long runs.



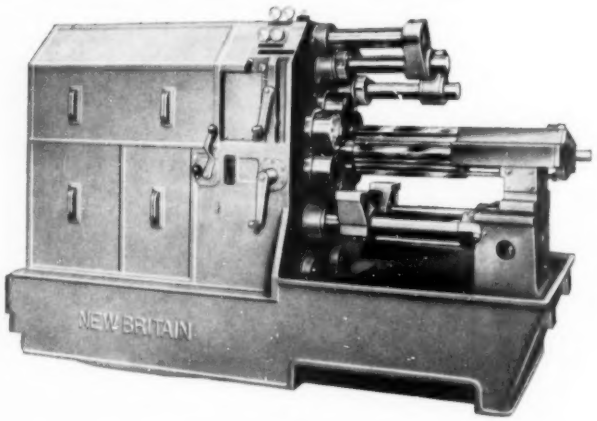
Model 126

New Britain single spindle automatic which belongs in almost every turret lathe department -- to cut costs on pieces on the border line between turret lathe and multiple spindle production. Remarkable for mechanical simplicity and simplicity of operation. A new approach in single spindle turning, it incorporates features which guarantee quick set up and manpower savings, on both short and long runs.



Model 675

Six spindle automatic chucking machine. This line of New Britains includes four, six and eight spindle machines, notable for rigidity, accessibility and permanent accuracy. Open end construction makes tooling, loading, operating adjustments and chip removal simple and easy, reducing down time to a minimum. This, combined with ample power and high spindle speeds, makes them outstanding for sustained high production.



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LUCAS HORIZONTAL BORING, DRILLING & MILLING MACHINES
NEW BRITAIN +GF+ COPYING LATHES

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
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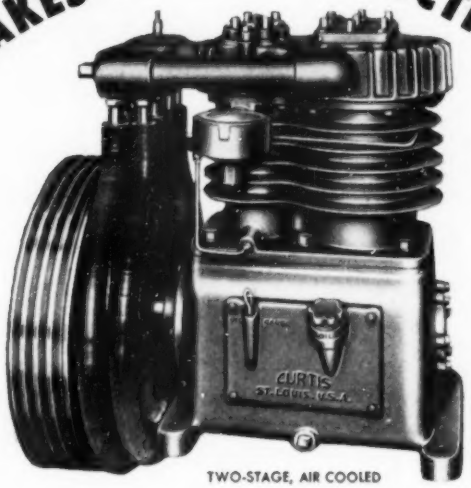
Dependable, Efficient

Curtis AIR COMPRESSORS AIR HOISTS AIR CYLINDERS

MAKES YOUR PRODUCTION MORE PROFITABLE

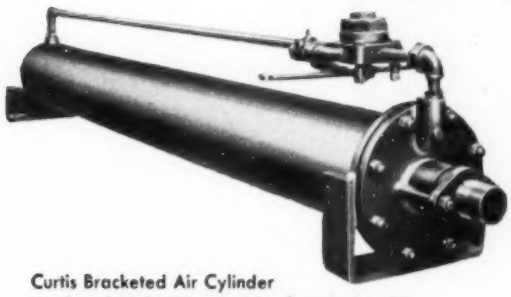


TWO-STAGE, AIR COOLED

PRECISION BUILT COMPRESSORS UP TO 50 H.P.

- Advanced two-stage design saves electric current.
- Delivers more air per horsepower.
- Timken tapered main bearings.
- Pressure lubricated rod and piston bearings.
- Assures long trouble-free performance.

TIME-SAVING Curtis Air Cylinders and Air Hoists



Curtis Bracketed Air Cylinder can be placed in any position from horizontal to vertical. Will lift, lower, push or pull.

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- Accurately controlled operating speed
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Curtis Pendant Air Hoist for any lifting or lowering job where headroom is not limited.

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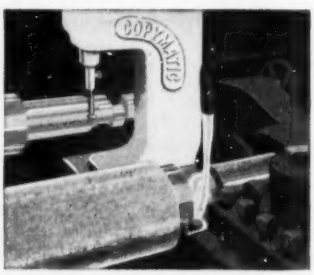
HOW HIGH IS UP?



Perhaps it's "the point toward which manufacturing costs are constantly climbing." What methods may be used to keep costs and prices from vanishing out of sight and reason?

Since time and manpower are the vital elements in costs, many progressive manufacturers are using Lodge & Shipley COPY-MATIC Tracer Controlled Lathes to combat rising costs. Carefully verified reports show time savings as high as 87%, production increases up to 536%, savings of $14,000 in a year.

The COPYMATIC is so versatile even smaller shops find it a profitable producer . . . it offers instant changeover from tracer control to engine lathe. A COPYMATIC can save you money, too. Ask for case histories and Bulletin No. 675.

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NATCO HOLETAPPERS

Lower Maintenance Costs and Increase Production

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Developed and Patented by NATCO for Outstanding Performance

NATCO ENGINEERED for Quality and Quantity Production

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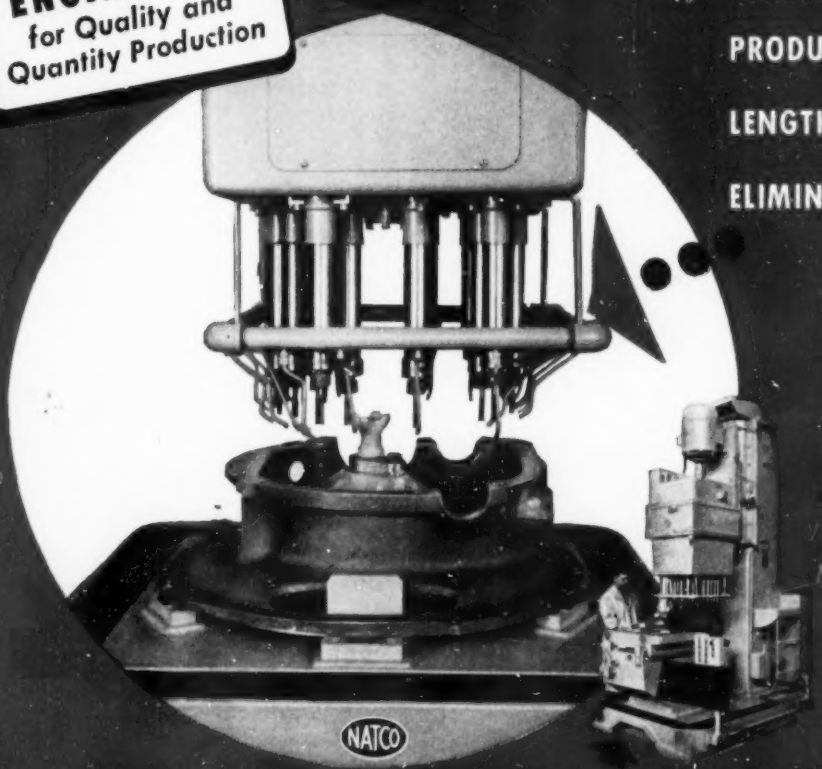
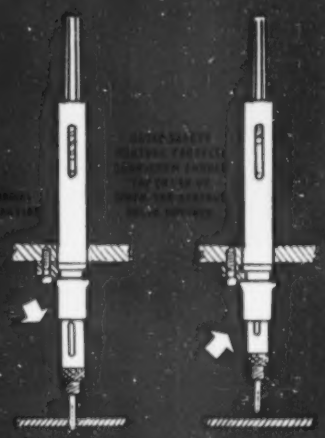
PRODUCE ACCURACY

LENGTHEN TAP LIFE

ELIMINATE COSTLY DOWNTIME





THIS IS A VERTICAL NATCO HOLETAPPER ... tapping twenty holes simultaneously in a gear case. NATCO HOLETAPPERS are provided with reversing motor drives as well as individual lead screws. They are available with any number of spindles for vertical, angular or horizontal operation in a range of sizes and capacities. Write for details.

NATCO

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

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ANNOUNCING the new BRYANT

BRYANT proudly introduces the newest member of the Bryant family of precision machines — the Bryant 998 Boring Machine — a production machine for precision boring, drilling, turning, facing, grooving and contour turning and boring where fine finish and rapid production are desired.

The Bryant 998 can be tooled either as a single purpose machine for quantity production or for miscellaneous work on small lots. Because it is all-mechanical, its cycle is positive and constant.

Smooth, uniform motion of the table and freedom from vibration, so essential to generating a fine finish with a single point tool, are assured by the 998. Its bed, bridge, heads and table are Meehanite castings. The table moves on preloaded ball bearing slide bars and is mechanically actuated by a simple cam and lever unit. Cam and change gears are easily accessible for changing either the length of stroke or the rate of travel. The motors for driving the cam and the boring heads are mounted in an accessible cavity inside the bed, thus keeping floor space to a minimum. This cavity is fan ventilated.

Ample fixture mounting surface is provided by the table, which measures 17½" x 22". The table has three ½" T-slots, and will accommodate a wide variety of fixtures. Machined setup pads are provided on the bridge for ease in locating fixtures.

The design of the Bryant 998 takes full advantage of standard purchased parts. Brakes, motors, air cylinder, bearings, pneumatic follower system, lubrication hoses and all electrical apparatus are stock items. Either low or high pressure coolant systems are available. All electrical equipment conforms to J. I. C. standards.

BORING MACHINE

Design

- The bed, bridge, table and heads are normalized Meehanite castings.
- The cam actuated table moves on preloaded ball slide bars.
- The cam is hardened and ground.
- The boring head spindles rotate in preloaded super-precision ball bearings. A graduated spindle nose and eccentric bushing for tool setting are standard.
- An air cylinder opposes the work table motion directly with constant pressure and keeps the cam follower roll and the cam always in contact.
- The boring head drive is completely accessible and is designed for long life.
- The cam drive assembly is protected by a torque limiting clutch.
- Cycle time is controlled by precision change gears in the cam drive gear box.
- An ample pad is provided at the rear of the machine for mounting accessory equipment.

Operation

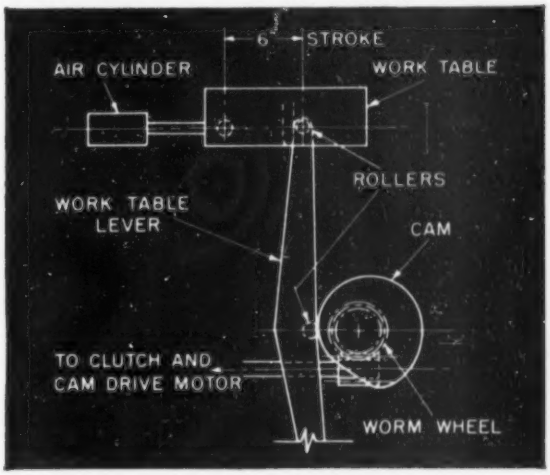
- Push button controls are conveniently located on a panel at the front of the machine.
- Cycle can be manual, semi-automatic or fully automatic.
- An emergency stop button will instantaneously interrupt the cycle.
- Jog buttons are located on both the front and the rear of the machine for setup purposes.
- Machined setup pads are provided on the bridge for ease in locating fixtures.

Maintenance

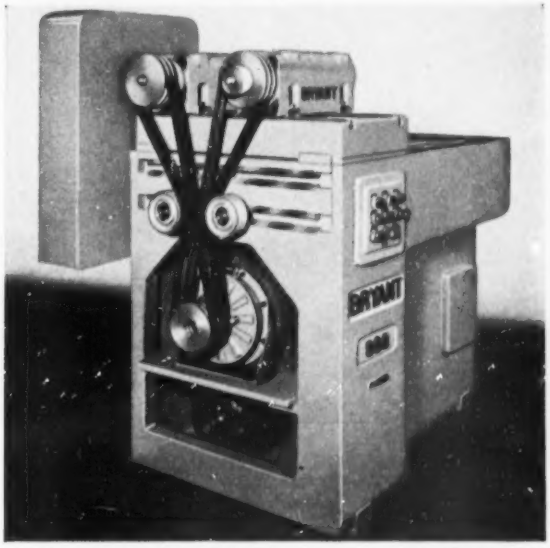
- Maintenance is necessary at only three points: two grease fittings on the cam follower assembly and cleaning and lubricating of the filter-lubricator unit in the pneumatic system.
- The ball slide table is grease sealed.
- Gear box has its own closed lubrication system.
- The boring head bearings are permanently grease sealed.
- The cam is easily accessible for changing the table stroke It is taper mounted and keyed to the drive shaft to ensure ease of changing and accurate mounting.
- The change gears are enclosed in their own wet sump, splash lubrication system.
- Brakes, motors, air cylinder, bearings, pneumatic follower system, lubrication hoses and all electrical apparatus are standard purchased parts.

Write today for complete information and specifications!

Smooth response of the table is ensured by the special Bryant slide bar design. Each bearing is a hardened steel sleeve containing numerous ¾" diameter preloaded balls. This provides a metal-to-metal contact which resists forces in all directions and transmits stresses directly to the bed.



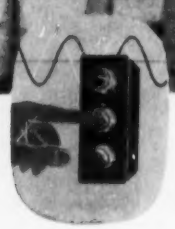
The table is actuated by an inexpensive, quick-change cam working through a follower and lever arm. An air cylinder opposes the work table motion, keeping the cam follower and the cam always in contact to completely eliminate back-lash and jump.



Cam drive and boring head motors are mounted in a well ventilated cavity in the bed.

BRYANT Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal Grinders, Internal & External Thread Gages, Granite Surface Plates, Boring Machines



AUTOMATION STARTS WITH WESTINGHOUSE MOTORS

How *Life-Line* motors at Studebaker Plant met demands for dependability

150 "V" engine cylinder heads per hour . . . completely tapped, drilled and milled. This pace, set by a multiple-spindle, automatic transfer machine at the Studebaker Plant, accents the need for dependable drive motors. The failure of but one motor could cripple production on the entire line.

Life-Line* motors, sixty-four in all, were selected to keep this vital machine humming. From the day they were installed at Studebaker—7 years ago—until today, Life-Line motors have operated at peak efficiency year after year and with minimum maintenance required.

This proof of Life-Line dependability, duplicated thousands of times on varied applications, stems from special Life-Line motor features. For example:

Trouble-free Life-Line bearings

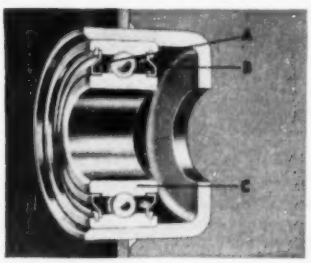
Motor outage from bearing failure is erased with Life-Line motors. The bearings are properly lubricated and tightly sealed at the factory, thereby ending the threat of burnout from over or undergreasing. Dirt and dust are locked out. Bearing maintenance can be forgotten.

Advanced Life-Line winding design

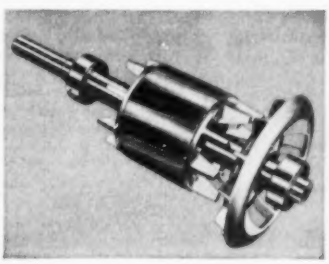
Round bottom slots in Life-Line motor stators improve winding techniques. They give uniform seating to the coil thereby, eliminating air pockets that hold heat. There's no space where damaging dirt or other foreign materials can collect. Tufvar® enameled wire coils pack more copper in a given slot . . . have maximum dielectric and mechanical strength.

Learn fully how these and other Life-Line motor features provide the power and stamina demanded for your applications. Ask your Westinghouse representative for a copy of B-4769-A, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21750

*Trade Mark



Sealed Bearings, Pre-lubricated
A—Channels packed with proper grease that inhibits oxidation and deterioration.
B—Positive bearing seals prevent grease seepage . . . lock out dust and other foreign materials.
C—Double-width bearing gives maximum support to shaft.



Dynamically Balanced Rotors
The rotor of every Life-Line motor is dynamically balanced on a Dynetric® balancing machine. This balancing operation assures Life-Line motors maximum freedom from vibration . . . reduces wear and generally lengthens the service life of the motor.

YOU CAN BE SURE . . . IF IT'S Westinghouse

APPARATUS DISTRIBUTOR WESTINGHOUSE

CLEVELAND PROUDLY PRESENTS

THE 4¼" MODEL AB
SINGLE SPINDLE DIALMATIC

ELECTRIC FEED DRIVE FOR TURRET TOOLS—NO CAM CHANGES

The first Cleveland Model AB Dialmatic—a 2½" machine—was introduced to the Metalworking Industry in 1947, at the Chicago Machine Tool Show. It met with *immediate* success! Since that time, further engineering refinements have been added to the basic design until today's ultra-modern 2½" and 3" Model AB Clevelands are the most *versatile* single spindle automatics in the field!

Now, Cleveland offers you the same precision, high-speed and low-cost production characteristics of the 2½" and 3" Model AB's in this new, larger capacity, full automatic turret machine.

Equipped with *electric feed drive,* the 4¼" Cleveland Dialmatic is so simply set-up that it rivals hand-operated machines for production economies on short runs. Separate, infinitely adjustable forward and return feed rates for each of five turret tools are quickly set by positioning dials on the control panel. No cam changes are necessary.

Many other features contributing to further the speed of set-up, and the flexibility of operation, make this new Cleveland *unequalled* for lowering the unit costs of component parts up to 4¼" O.D. machined from bar and tube stock. A few, basic specifications and design features are listed at right. Let a Cleveland sales engineer give you *complete* details . . . then start planning for *savings* in your shop!

MAJOR SPECIFICATIONS AND FEATURES:

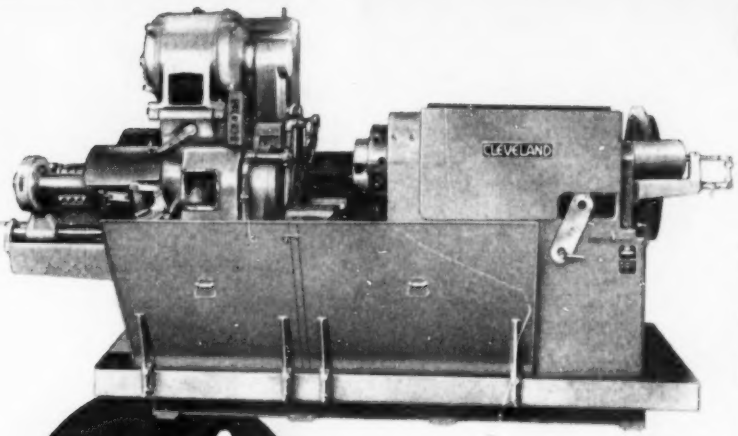
Spindle speed range—21 to 648 rpm. Four automatic spindle speeds through four-speed motor. Two spindle speed ranges controlled by hand shift clutch with seven speed changes in each range through change gears.
Number of spindle speeds—56
Tool turret diameter—14"
5-hole tool circle—10"
Stock feed stroke—14"
Turning length—7⅝"
Idle motion time—16.9 secs.

Variable turret tool feeds through electric feed drive.
High-speed Geneva turret index.
Geared anti-friction spindle head.
Wide, flame-hardened double cross slides independently operated by easily adjusted drums.
Universal camming.
Rapid hand crank stock feed adjustment.
Oil feed through turret.
Toggle-type chucking mechanism; three chucking fingers; Cleveland-designed master collet with quick-change pads.
Safety device prevents running machine with set-up crank engaged.
Motorized chip conveyor available.

Write for new bulletins.

NOW, MORE THAN EVER, CLEVELANDS CUT COSTS!

NEW AUTOMATICS TO CUT YOUR METALWORKING COSTS



NEW
4¼" MODEL AW
CLEVELAND

CLEVELAND

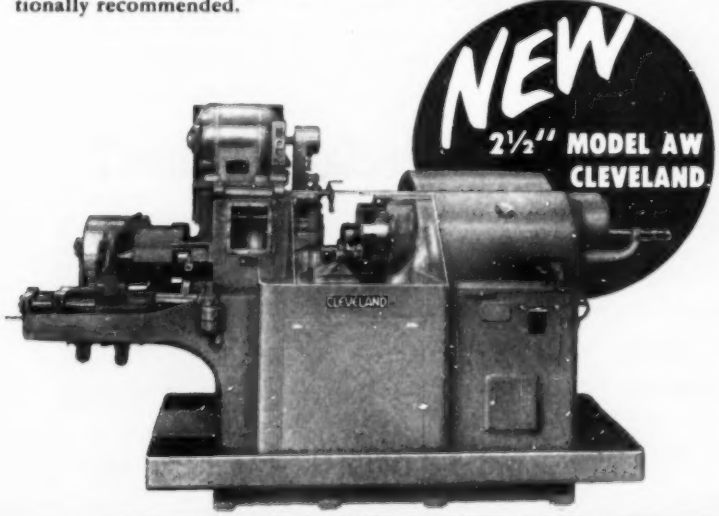
2½" AND 4¼" MODEL AW SINGLE SPINDLE AUTOMATICS

Simplified, fool-proof design . . . priced exceptionally low

New Model "AW" Clevelands are destined to become the "work horse" automatics of many a shop. These are high-speed, accurate, *rugged* machines—quickly set-up; easily operated. Their simplified mechanical design will result in the reduction of machine maintenance to bare minimum levels.

An example of "AW" economy—the 2½" Model "AW" is offered at a base price $3500 to $4000 *less* than other automatics of comparable capacity! Price of the 4¼" "AW" is proportionately low!

The principal difference between the new series Cleveland "AW" Models and the universally popular Model "AB" Cleveland lies in the turret tool feed drive. Variable forward and return turret feeds on the "AW" machines are obtained through automatic settings of an improved, simplified mechanical drive. This thoroughly tested feed driving mechanism has been Cleveland-engineered to assure the user the utmost in *freedom from downtime!* For shops who prefer the ease and rapidity of set-up provided by *electric feed drive,* the Cleveland "AB" series of automatics is unconditionally recommended.



NEW
2½" MODEL AW
CLEVELAND

MAJOR SPECIFICATIONS AND FEATURES:

	2½" AW	4¼" AW
Spindle speed range	69 to 1920 rpm	21 to 648 rpm
Number of spindle speeds	40*	56**
Tool turret diameter	11⅜"	14"
5-Hole tool circle	9"	10"
Stock feed stroke	10½"	14"
Turning length	6"	7⅝"
Idle motion time	11.3 secs.	16.9 secs.

*Four full automatic spindle speeds for each set of five change gears—two automatic speeds through two-speed motor; two automatic speeds through air-operated spindle clutch shifter.

**Four full automatic spindle speeds through four-speed motor—two speed ranges controlled by hand shift clutch with seven speed changes in each range through change gears.

Variable turret tool feeds through friction roll drive.
High-speed Geneva turret index.
Geared anti-friction spindle head.
Wide, flame-hardened double cross slides independently operated by easily adjusted drums.
Universal camming.
Rapid hand crank stock feed adjustment.
Oil feed through turret.
Toggle-type chucking mechanism; three chucking fingers;
Cleveland-designed master collet with quick-change pads.
Safety device prevents running machine with set-up crank engaged.
Motorized chip conveyor available for 4¼" Model AW.

Plus many other new and time-tested features that have earned for Clevelands their outstanding reputation for dependable performance.

Get full information on these new money-saving Model "AW" Clevelands now. Call in a Cleveland sales engineer.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

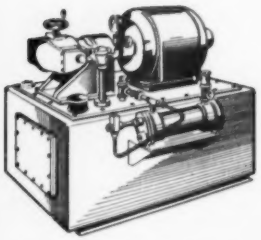
4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

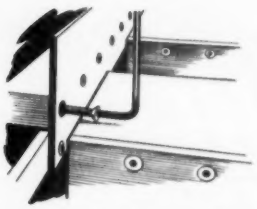
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Our Fiftieth Year

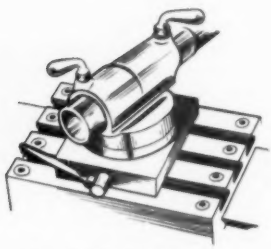
A START FOR THE FUTURE



USE UNBRAKO FLAT HEAD SOCKET CAP SCREWS for assembling thin section materials—on piston assemblies, electronic devices and radios.



On sheet metal parts, thin plates, strips and moldings.



On bench lathe milling attachments and other production machinery.

UNBRAKO FLAT HEAD SOCKET CAP SCREWS have the following features: heat treated alloy steel for strength; uniform 82° angle under head for maximum contact; accurate hex socket for positive, nonslip internal wrenching; fully formed threads—Class 3 fit; standard sizes—#4 to ¾"—in a full range of lengths.

Why pay much more for a special fastener?

Why pay high prices for a special, when a standard UNBRAKO socket screw will do the job as well. Delivery of a standard is much better, because it is stocked by your local industrial distributor. Write for UNBRAKO Standards. STANDARD PRESSED STEEL Co., Jenkintown 1, Pa.

Write for UNBRAKO Standards

UNBRAKO® SOCKET SCREW DIVISION

sps

JENKINTOWN PENNSYLVANIA

plus 3 minus 7

A Profitable Investment for *any* plant!

The world-renowned Otis Elevator Company recently installed three "AMERICAN" Duplicator Lathes which replaced seven engine lathes.

Such savings are the rule—not the exception—when "AMERICAN" Duplicators are put on the job.

These machines are performing "miracles" in savings in many of the largest and best known units of the metal working industry. They have introduced a new machining technique that has revolutionized the art of turning metal.

They reproduce work shapes from a template faithfully and accurately. They reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii, and are especially productive on such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

More and more the necessity of reducing manufacturing costs is crystallizing in the minds of management. The attention of directors, top officials and especially production executives is being focused to an increasingly greater degree upon cost-cutting equipment. It is inevitable, therefore, that the "AMERICAN" Hydraulic Duplicating Lathe should command the spotlight. Evidence from a hundred installations proves beyond a shadow of a doubt their leadership as top flight cost reducers.

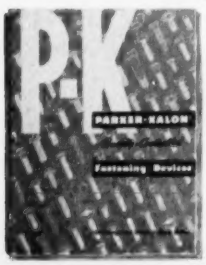
If it's proof you want just drop us a line—no obligation.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

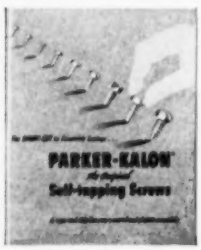
"Speeds up and simplifies our product design job . . . helps us make sure our planned assembly savings pay off."

P-K CATALOG AND ENGINEERING DATA



Illustrates and describes all P-K products. Tells "where, when, how, and why" P-K Fasteners are used. Shows many typical applications. Gives all needed information for selection and application . . . 88 pages.

P-K SELF-TAPPING SCREW BULLETIN



A 48-page separate edition of the Self-tapping Screw section of the General Catalog.

P-K ENGINEERING STANDARDS BOOK

A 64-page book of standard head and thread dimension drawings of P-K Screws, other useful data.

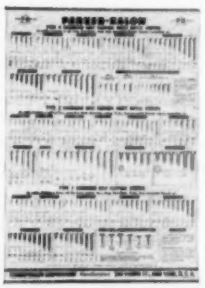
P-K SOCKET SCREW BULLETIN

A 16-page separate edition of the Socket Screw section of the General Catalog.

POWER DRIVING BULLETIN

Describes and illustrates the various basic types of electric, air-operated, and impact tools for driving P-K Screws, as well as hopper-fed automatic driving machines in common use. Includes useful information on bit and socket selection.

P-K SCREW SIZE WALL CHART



Wall hanger, 18" x 24", illustrates in actual sizes all standard P-K Self-tapping Screws and other Fasteners.

SOCKET SCREW DIMENSION FINDER

Pocket-size plastic slide chart gives essential dimensions of all types of P-K Socket Screws at a glance, including thread length formula.

STAPS FOLDER

Describes the characteristics of Parker-Kalon STAPS and their primary applications. Shows various forms of pre-assembled neoprene washers available.

"HOW TO MAKE PLANNED SAVINGS PAY OFF" BOOKLET

A 24-page condensed catalog of P-K Self-tapping Screws explains P-K quality control. Pocket-size, and packed with information.

PARKER-KALON®
Assembly Planning Aids and Engineering Service

USERS' GUIDE

Plastic bound, 20-page index-tabbed 11½" x 9" work-book of technical information on selection and application of P-K Screws. Has "hang-up" tab. Popular with designers, engineers, and draftsmen for quick reference.

"HOW TO USE" BOOKLET

Pocket-size booklet of hole-size recommendations and other application information. Useful for quick reference by assembly supervisors.

FOLDERS ON INDIVIDUAL PRODUCTS

Screwnails, Masonry Nails, and other P-K products and services are described in folders which point out primary uses.

ASSEMBLY PLANNING AIDS Originator and largest producer of Self-tapping Screws, and pioneer in the development and improvement of other P-K fasteners, Parker-Kalon is a leading authority on assembly engineering. Through long experience in working closely with designers, product engineers, and others responsible for fastener selection, P-K has prepared technical literature exactly keyed to your needs. It is published in various forms planned to save reference time, yet provide all required information.

ASSEMBLY ENGINEERING SERVICE Parker-Kalon field representatives are fully-qualified Assembly Engineers. They can advise you how to plan assemblies to save fastening time, add product strength, and lower costs. When required, the modern facilities of a completely equipped laboratory in the P-K plant are available for testing new applications, and detailed reports will be furnished for your guidance.

Since Parker-Kalon offers a complete line, the P-K Assembly Engineer's recommendations for Self-tapping Screw selection are unbiased. The P-K method fits the *right* screw to the job.

Ask your local P-K Distributor for the P-K literature you need. If desired, he'll arrange for a P-K Assembly Engineer to call. Or write: Parker-Kalon Corporation, 200 Varick St., New York 14.

PARKER-KALON®

The Original **SELF-TAPPING SCREWS**

Cold-forged **SOCKET SCREWS**

AND OTHER FASTENERS

Another typical

Morris

MOR-SPEED

production machine

performance record

35% SAVINGS IN LABOR

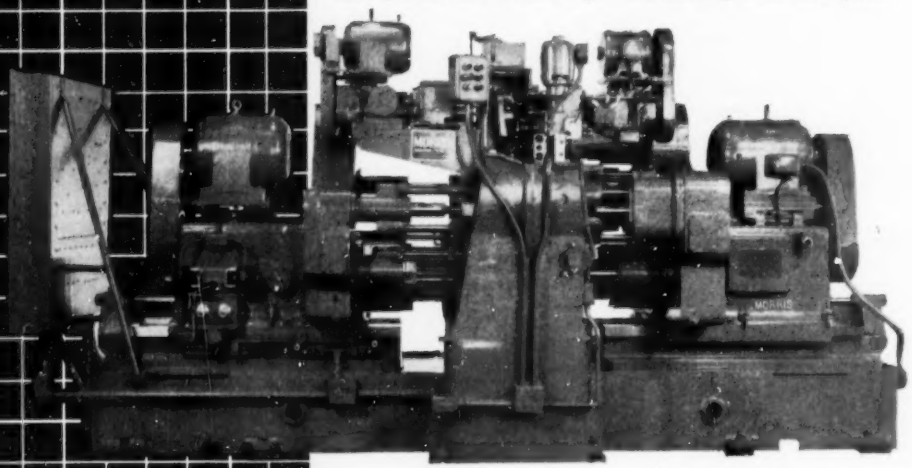
REPLACES 6 OLDER MACHINES

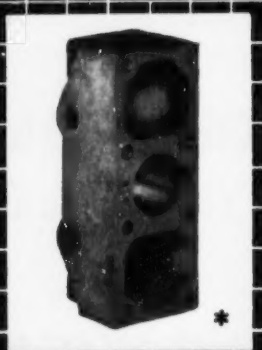
PAYS FOR ITSELF IN 9 MONTHS

The two way horizontal, eight station, automatic indexing machine illustrated drills, reams, countersinks, forms radius and taps 187 refrigeration unit cylinders per hour.

This unit is equipped with nineteen drilling spindles, fourteen countersinking spindles, four counterboring spindles, one reaming spindle and eleven tapping spindles. Twenty spindles are in the left hand head and eighteen in right hand head.

If your work requires numerous operations on a mass production basis, consult us. Our engineers are eager to serve you.





OPERATIONS PERFORMED:

Drill, countersink and tap 8,—¼"—28 tap holes

Drill, ream and chamfer both ends of 1⅛" hole

Counterbore for ⅝" dia. segment

Drill, countersink and tap 1—$\frac{8}{32}$ tap hole

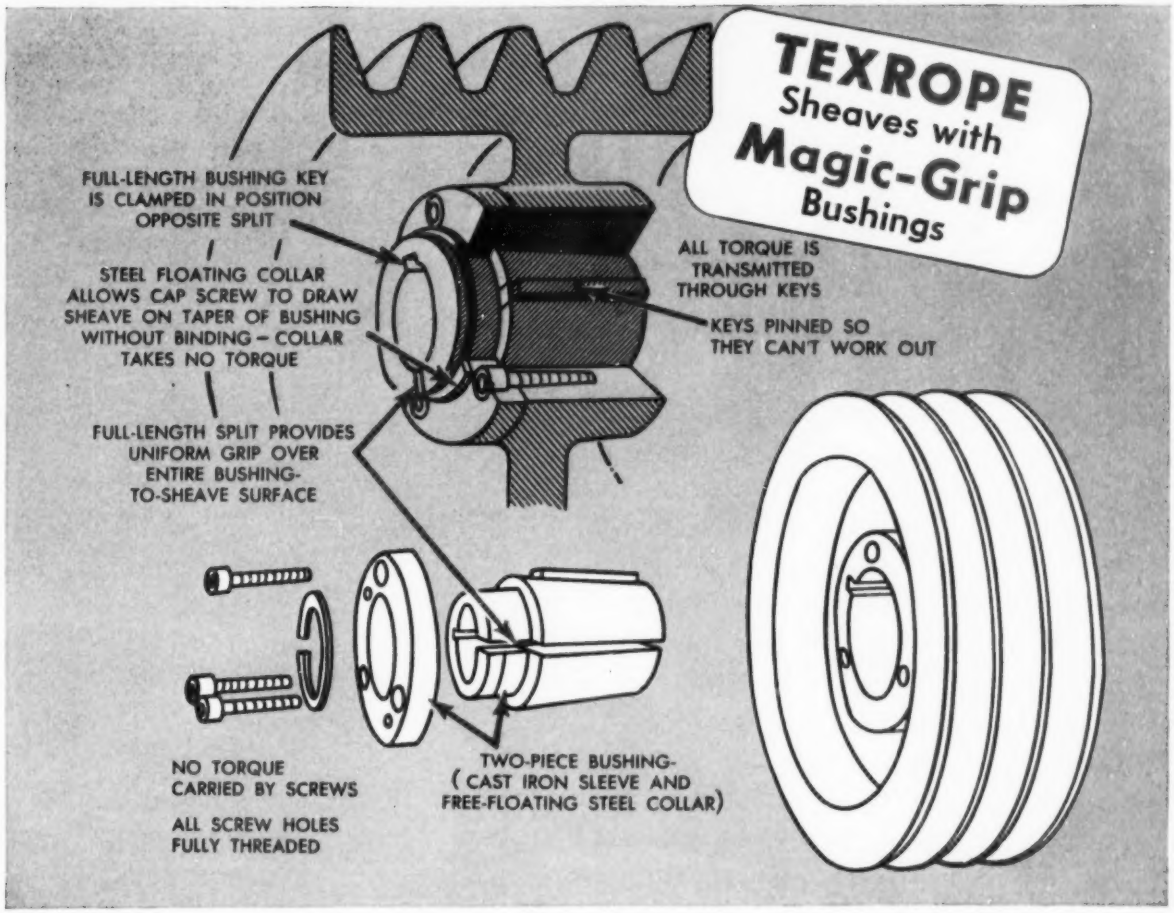
Drill, countersink and tap 2—⅜—24 tap holes

***Refrigeration Unit Cylinder**

Morris **THE MORRIS MACHINE TOOL CO.**

933 Harriet Street, Cincinnati 3, Ohio

"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."


TEXROPE
Sheaves with
Magic-Grip
Bushings
FULL-LENGTH BUSHING KEY IS CLAMPED IN POSITION OPPOSITE SPLIT
STEEL FLOATING COLLAR ALLOWS CAP SCREW TO DRAW SHEAVE ON TAPER OF BUSHING WITHOUT BINDING – COLLAR TAKES NO TORQUE
FULL-LENGTH SPLIT PROVIDES UNIFORM GRIP OVER ENTIRE BUSHING-TO-SHEAVE SURFACE
ALL TORQUE IS TRANSMITTED THROUGH KEYS
KEYS PINNED SO THEY CAN'T WORK OUT
NO TORQUE CARRIED BY SCREWS
ALL SCREW HOLES FULLY THREADED
TWO-PIECE BUSHING- (CAST IRON SLEEVE AND FREE-FLOATING STEEL COLLAR)

Get the Only Sheave with ALL the Most Needed Features

Here's Comparison of *Magic-Grip* Sheave and Other Sheaves

	Magic-Grip Sheaves	SHEAVE A	SHEAVE B	SHEAVE C
Bushing fully split for uniform clamping action.	Yes	Yes	No	Yes
Load carried by keys instead of threaded bolts.	Yes	No	No	No
Bushings cover full range of NEMA "probable" shaft diameters.	Yes	Yes	Yes	No
All screws engage full thread.	Yes	Yes	Yes	No
Mounts in one piece.	Yes	No	Yes	Yes
Squares itself with shaft.	Yes	No	No	No

A-4167

Texrope and *Magic-Grip* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

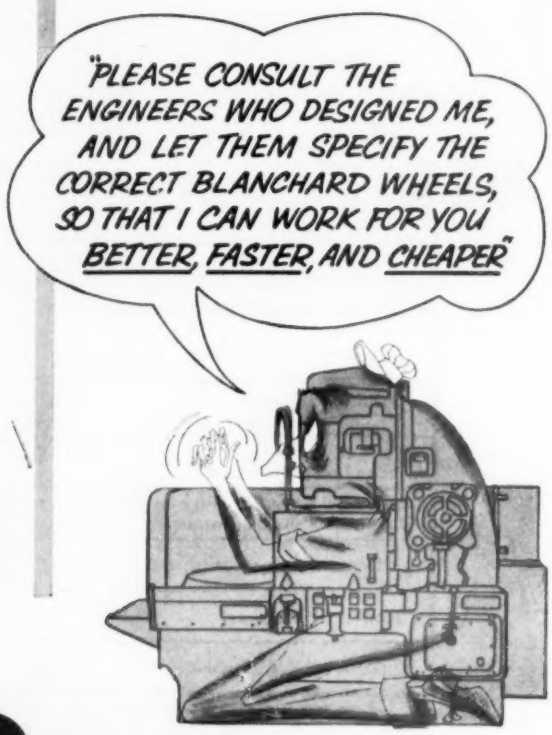
UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.


"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

HIGH PRODUCTION SETUP FOR THIN-WALL PARTS

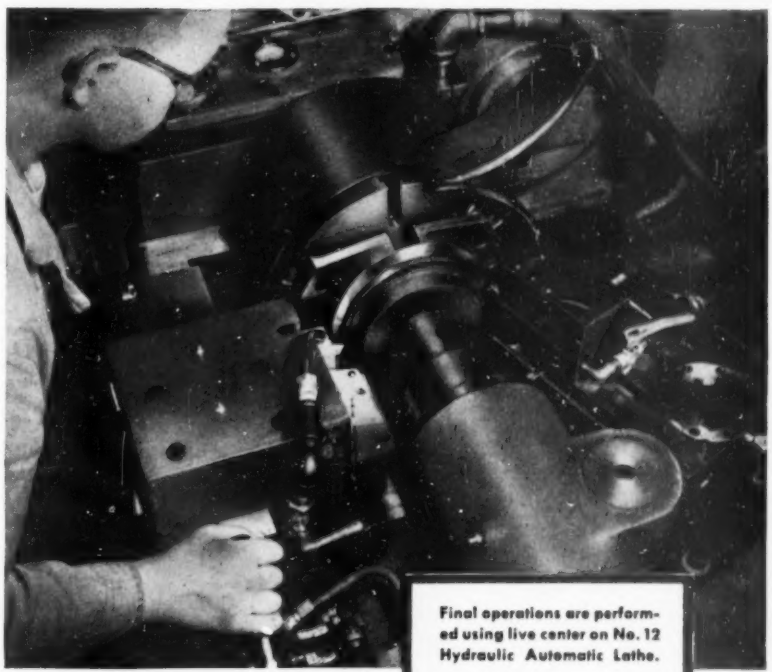
1 Man Tends 3 No. 12 Hydraulic Lathes on Fast, Precision Work

How to get the needed high production on tricky thin-wall parts requiring a large number of operations?

This manufacturer found the most practical solution was dividing the work among three No. 12 Hydraulic Automatic Lathes. By this method only one man is required to operate all three machines, turning out a completed part every 1.3 minutes . . . keeping costs at rock bottom.

Each No. 12 Hydraulic Lathe has the same type 12″ three-jaw air chuck for holding the stainless steel ring flange. Compensating serrated jaws, grip the workpiece with support for over three-quarters of the circumference. This eliminates danger of springing the part with total pressure.

Here's fast, precision machining of delicate parts involving 13 operations on 3 No. 12 Hydraulic Lathes—with one operator.



Final operations are performed using live center on No. 12 Hydraulic Automatic Lathe.

Operations are divided up this way:

1st—*Part is held on the O.D. Turn, face, bore, counterbore and chamfer. This single operation completes the thick base section shown here.*

2nd—*Part is held on previously machined O.D. Rough turn O.D. Rough and finish turn the tapered I.D., face and chamfer. Part now looks like this.*

3rd—*Part is held on same surface and supported with a live center. Finish form the O.D., face and chamfer; part is then completed.*

Ask for bulletin showing the No. 12 Hydraulic Automatic Lathe doing 28 widely different jobs which illustrate its unusual flexibility.

GISHOLT

TIME-SAVING IDEAS

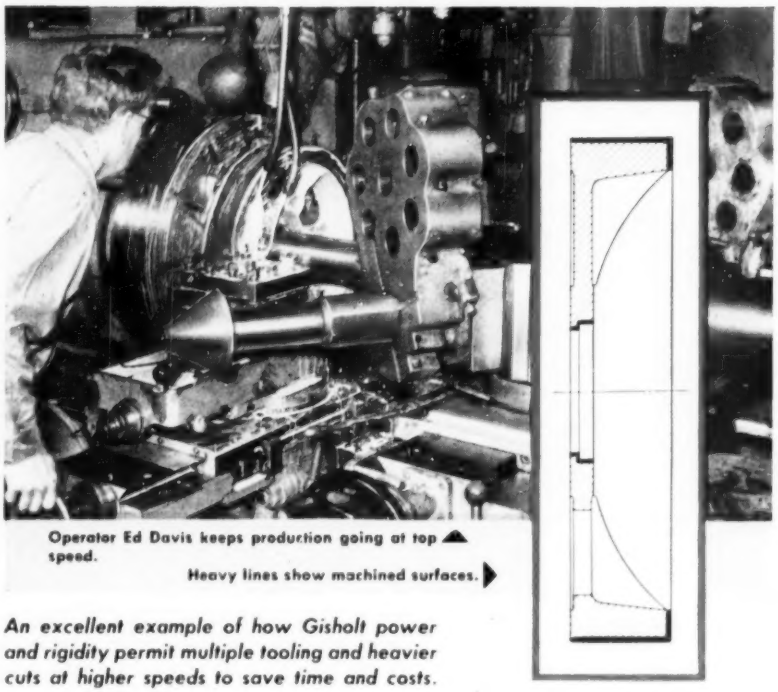
New Saddle Type Lathe Permits Multiple Cutting at Higher Speeds

Perhaps you, too, can take advantage of sheer power and rigidity in a turret lathe to cut your costs. Hyster Company of Portland, large manufacturer of handling equipment, formerly machined these heavy drum gears on a pre-war machine. Production of the 22", 260 Brinell parts averaged an hour for the first operation.

When they put the job on a new Gisholt 4L Saddle Type Turret Lathe, floor to floor time was cut in half—with parts completed in 30 minutes. Simultaneous machining from both turrets, plus faster operating speeds—and the ability to take heavier cuts, account for the increased production.

A 28" three-jaw chuck holds the part in the cored holes in the web. Rough and finish boring, counterboring and facing operations are handled from the cross-feeding hexagon turret. At the same time, tools on the square turret face and turn the O.D. Production is in lots of 100.

HOW HYSTER COMPANY CUT COSTS IN HALF ON HEFTY PARTS



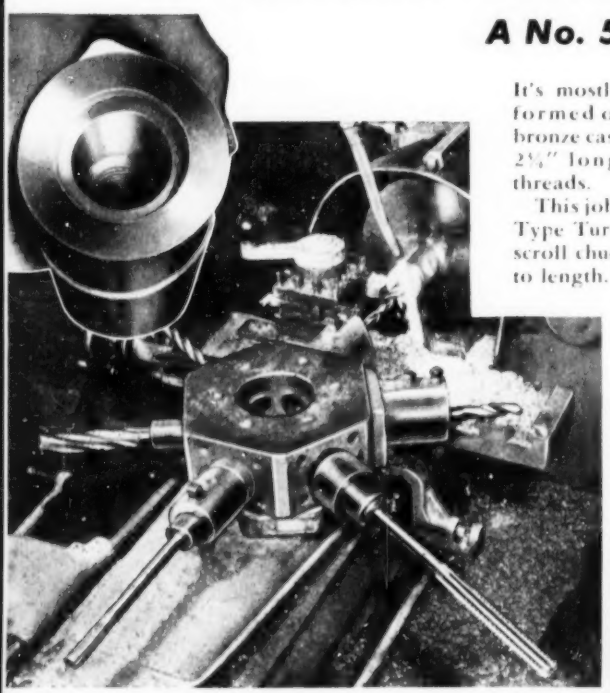
Operator Ed Davis keeps production going at top speed.

Heavy lines show machined surfaces.

An excellent example of how Gisholt power and rigidity permit multiple tooling and heavier cuts at higher speeds to save time and costs.

FINE SETUP FOR FAST MACHINING OF BRONZE NUTS

A No. 5 Ram Type Turret Lathe Job

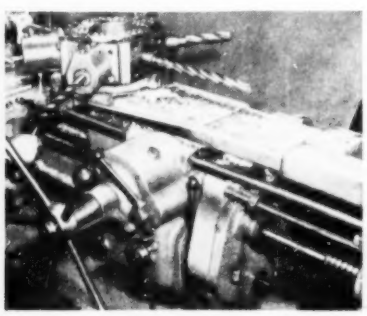


Turret Lathe setup for bronze nuts.

It's mostly inside work to be performed on these hard aluminum bronze castings calling for a ⅞" hole 2⅝" long with four t.p.i. Acme threads.

This job is set up on a Gisholt Ram Type Turret Lathe with a three-jaw scroll chuck. The square turret faces to length. Next, three successive stations on the hexagon turret start drill, drill through and bore. At the same time, the O.D. is turned from the square turret.

The counterbore is then made and the hole is reamed full depth from the hexagon turret. The end is then formed from the square turret. Finally, the rough, semi-finish and finish taps are used with the threading attachment on the hexagon turret.



This well planned tooling plus instantaneous speed changes with the Hi-Lo trip lever, keep production moving fast.

Engaging the threading attachment.

GISHOLT

TIME-SAVING IDEAS

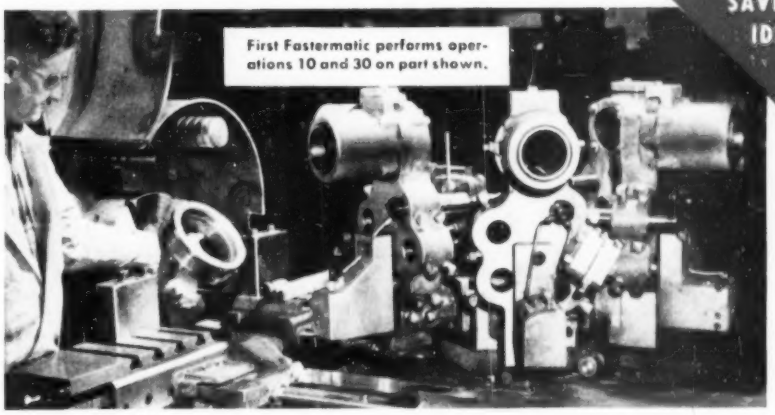
DOUBLE TOOLING FOR 4 OPERATIONS ON 2 MACHINES

Easy Changeover on Fastermatics Simplify Job

The question here was how to perform four separate machining operations on these steel bearings with a minimum of equipment . . . and with one operator, if possible.

Double tooling of a pair of Fastermatic Automatic Turret Lathes provided the answer. Here's how: Operations 10 and 30 are handled on the first machine, operations 20 and 40 on the other. A single operator, because of the Fastermatics' automatic cycles, is able to tend both machines.

With both sides roughed after operations 10 and 20, he makes easy changeover of the two machines for operations 30 and 40. Double tooling on both machines means simply a change of chuck jaws and some small tool holders.



First Fastermatic performs operations 10 and 30 on part shown.

As shown here, in operation 10, seven different surfaces are rough machined by tools mounted in the turret and both cross slides. Unused turret stations are by-passed. Nine surfaces are finish machined in operation 30—those already roughed out plus an additional counterbore and a necking operation. The other machine operates essentially the same.

With careful planning, 2 Fastermatics do double duty with minimum changeover.

SHOWING HOW "SPECIAL" MACHINING PROBLEMS CAN HAVE SIMPLE SOLUTIONS

. . . especially with the Simplimatic

Before machining this steel bevel drive gear, this producer had to get answers to:

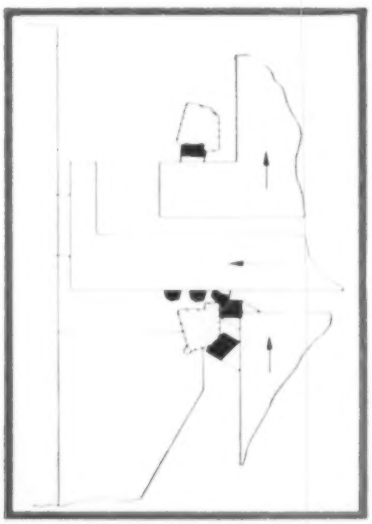
1. **How to bore, face and counterbore in 1st operation . . . made more difficult because the counterbore is on the chuck side of the piece.**
2. **How to get two tool slides within the 4" I.D. for simultaneous boring and counterboring.**
3. **How to spare the expense of a special machine and elaborate tooling . . . and yet have rapid changeover to the 2nd operation.**

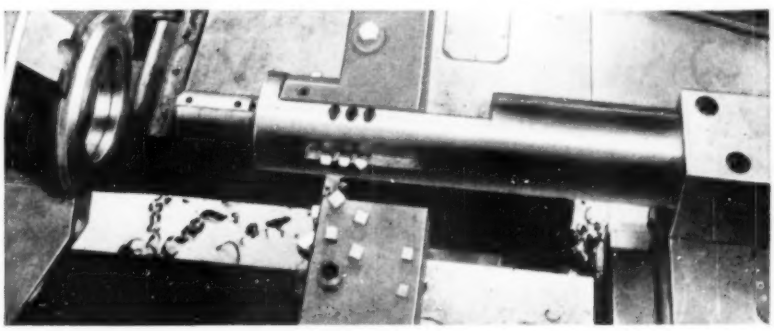
The ready answer to all three questions was the standard Simplimatic Automatic Lathe equipped with special tool blocks on standard slides.

The front slide feeds across the part to face and break the corner. The tool on the rear slide, which backfaces and forms the counterbore, is carried on a holder recessed into the oversize boring bar, thus providing room for getting into work. This boring bar, carried on the center slide which roughs, finishes and chamfers the bore, is supported by the pilot in the spindle (see layout).

Time is only 1.5 minutes, f. t. f.

The standard Simplimatic, with its infinite possibilities of slide and tool arrangements, avoids the need for a special and costly machine.





Note how special tool block in rear slide starts from cutaway in oversize boring bar.

GISHOLT

TIME-SAVING IDEAS

HOW TO MULTIPLY OIL SEAL LIFE 8 TIMES

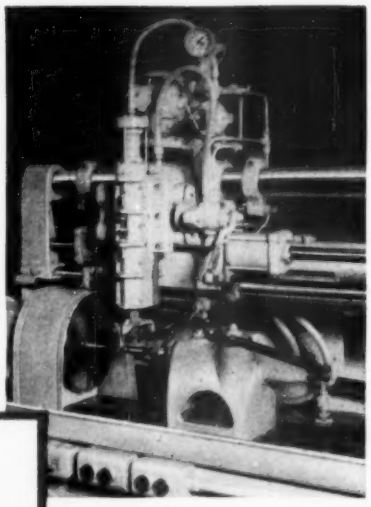
Woodward Governor Company Keeps Seals Oil-Tight Longer by Superfinishing

If oil seals in these diesel engine governors lose their oil-tightness, it means serious trouble: (1) Because the power piston operates in a vertical position, reciprocating action could cause loss of sump oil. Also, (2) any leakage at the main drive seal might result in engine oil contaminating governor oil and impairing its operation.

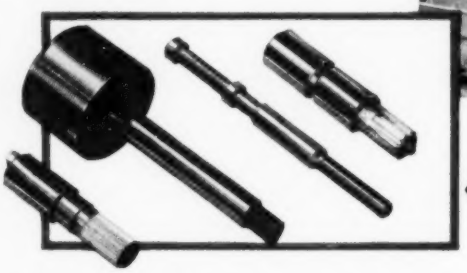
How to make the seals oil tight, and keep them that way longer? The solution was simple: by Superfinishing. It's shown in action here, at **Woodward Governor Company,** Rockford, Illinois.

The parts come to the Model 51-A General Purpose Superfinisher with a ground finish of 10 micro inches. After Superfinishing, they have a surface smoothness of 3 micro inches. Production is at the rate of 40 pieces per hour—with inspection for size and finish made by the operator, while the machine goes through its automatic cycle.

Here, at negligible cost, Superfinish assures oil-tight seals and at least 8 times longer seal life by removing all amorphous "smear metal."

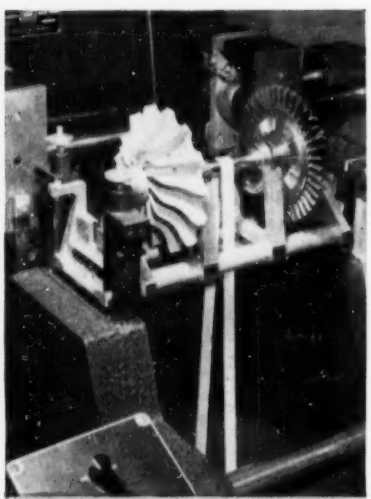


Close-up shows Superfinisher doing pilot valve of engine governor.



Superfinished components of governor: drive shaft, power piston, pilot valve, rotating bushing.

HIGH-FLYING PARTS BALANCED TO .020 OUNCE INCHES



Note how the impeller is balanced while running in its own ball bearings.

Direct Reading Shows Stock to Be Removed for Correction

Supercharger impellers for high-altitude aircraft call for dependable accuracy of balance.

Doing the job of assuring smooth, dependable operation is a Gisholt Type 3S DYNETRIC Balancer. The workpiece is rotated with its own ball bearings, thus duplicating normal operating conditions. Unbalance is read directly in terms of stock to be removed. This avoids errors in translating ounce inches into actual correction to be made. Stock is removed from the scallop on one end and the rotor on the other.

In a matter of seconds the entire operation—locating, measuring and correcting—is completed, and the part is balanced to an accuracy of .020 ounce inches. Gisholt Balancers are easy to set up and can be operated by average shop personnel.

To insure lasting, vibrationless operation, balancing of impellers is made a regular part of production—with a speed and accuracy not possible on any other equipment.

Textbook on balancing, **yours for the asking. Has all the facts, helpful information. Write for "Static and Dynamic Balancing."**

DYNETRIC BALANCERS

Complete Balancing School

Students from more than 100 companies have already completed courses in the Gisholt Balancing School—the only training of its kind available today. Write for details, starting dates.

No. 9-1053
580

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

Write for your copy of Gisholt's new general catalog.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

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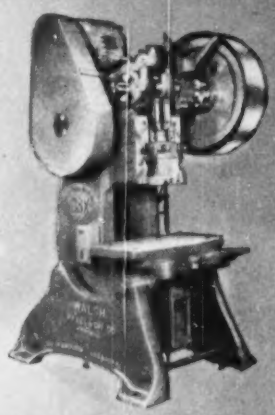

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Some made in 1907 with rugged dependability are *still* operating at a profit. Wide selection of sizes from 6-65 tons . . . STOCK to 4 weeks delivery. 24 HOUR REPAIR *SERVICE* See Bulletin 353 for *more* details.

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. . . give you 5 *or more* gages for the price of one—*reversible* and extra length for new gaging surfaces at no additional cost.

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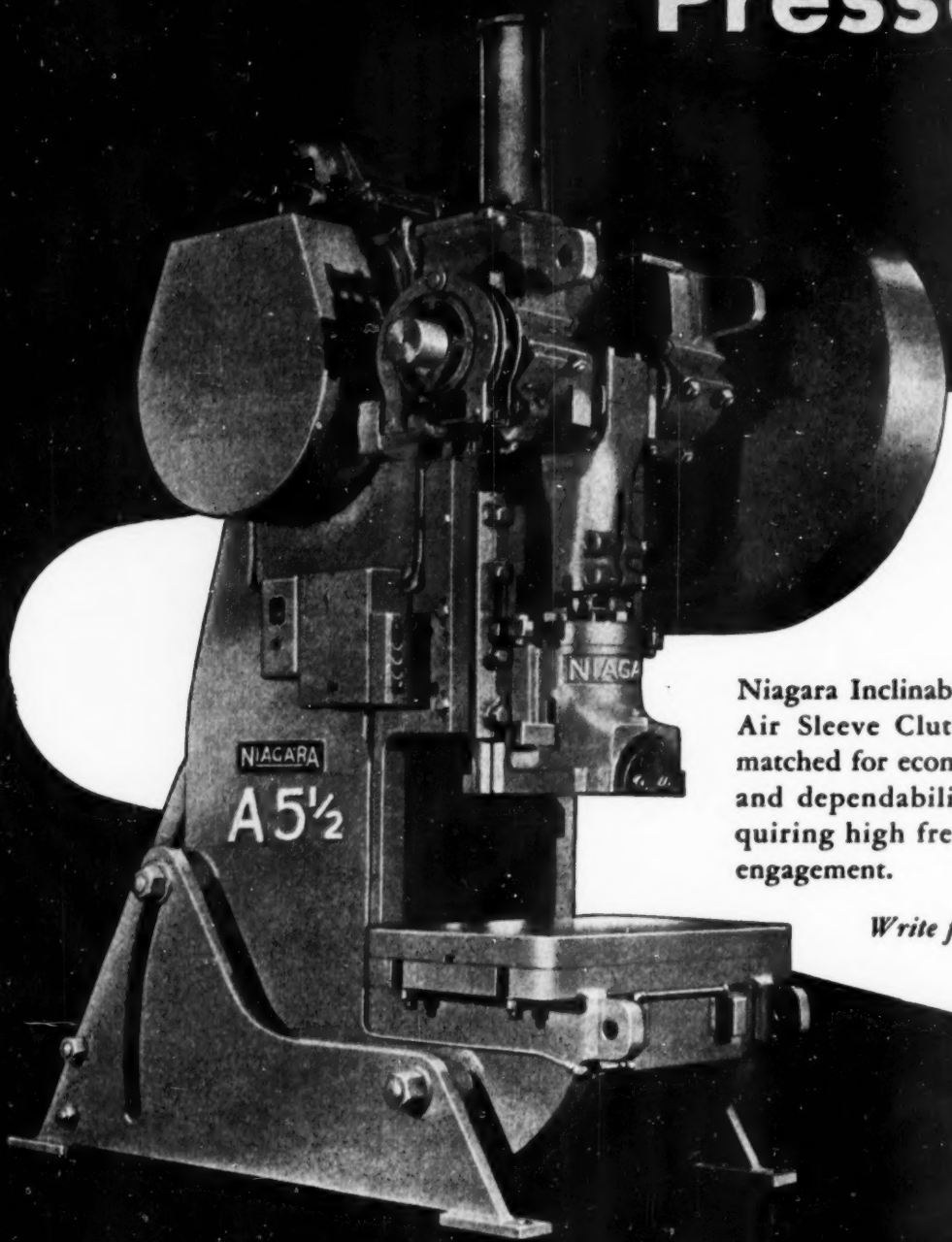
NIAGARA Inclinable Presses



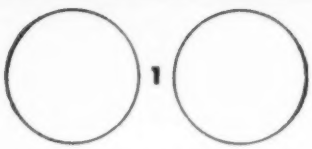
Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

Write for information.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT

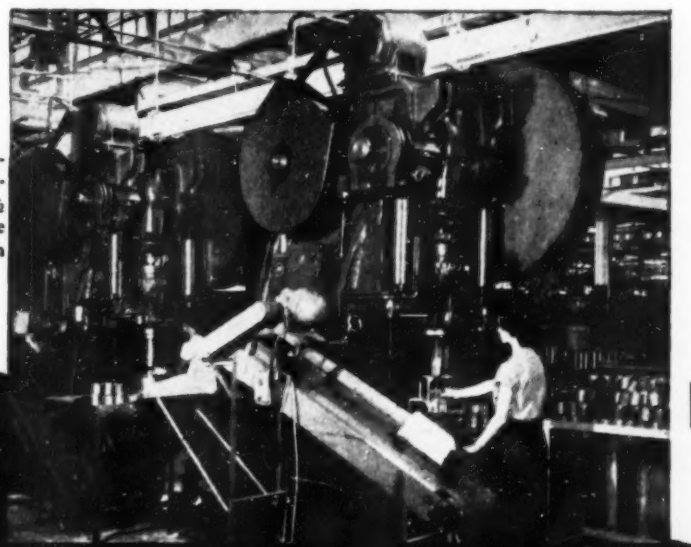


1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.

2, 3. Cupping and Redrawing on A-5½ Presses with Air Sleeve Clutches.

4, 5, 6, 7. Indenting end on A-3½ Presses.

8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

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America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

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NEW HF INDUCTION HEATING GENERATOR

PUTS FULL POWER INTO A WIDER VARIETY OF LOADS

Westinghouse now presents a new high-frequency generator with 25 KW output at 100% duty cycle. For optimum performance, the new 25 KW has a tank kva of 1620. This means you can now put full power into a wider variety of loads . . . even where close coil coupling is impractical. Non-ferrous materials, like brass, copper and aluminum, can be heated in much shorter time. You benefit in higher production rates at lower costs.

This latest addition to the Westinghouse line of induction heating tools has many more outstanding benefits. Here are some of them:

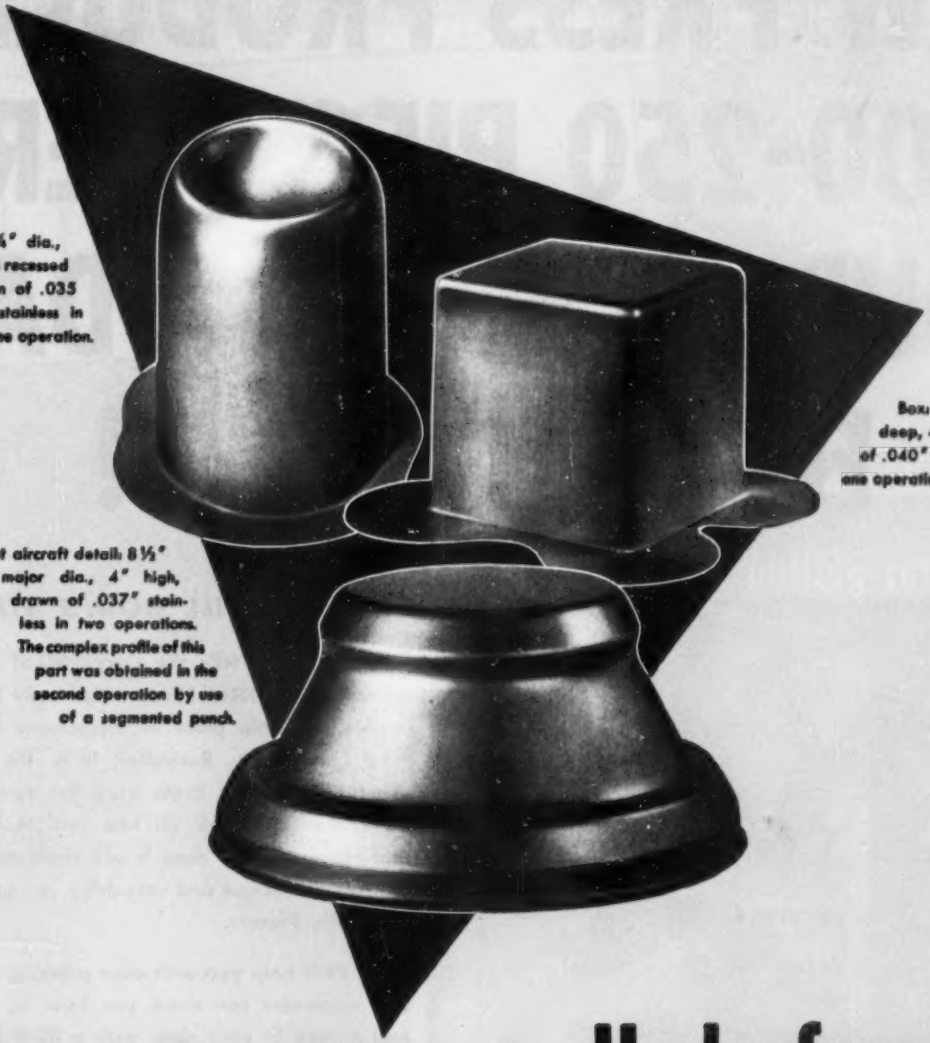
- Allows positive, precise heat control of short production runs on a variety of jobs . . . or long production runs with rapid heat cycles. The built-in electronic keying of power output that makes this possible also eliminates main contactor arcing.
- Provides smooth variation of power output from 25% to 100%. This simplified power output system utilizes dependable, maintenance-free saturable reactors and longer-life, cost-cutting diode rectifier tubes.
- Gives complete protection against condensation and water-impurity troubles. The built-in distilled water cooling system and heat exchanger offers substantial raw water economy, too.
- Assures long tube life, peak performance and minimum maintenance by close regulation of filament voltages.
- Offers easy inspection and maintenance through the full-opening double doors; easier operation through a simplified combination of conveniently located controls.

The new Westinghouse 25 KW RF Generator is available now in this de luxe model. A standard model is also available with electronic keying and smooth power output control features as easily-installed optional accessories. Both models offer flexible, economical handling of hardening, annealing and metals-joining jobs. For full information write: Westinghouse Electric Corporation, Electronics Division, Induction Heating Section, 2519 Wilkens Avenue, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S **Westinghouse**

J-02270

DRAW cups, cubes and complex contours...



Cover: 4¼" dia., 5½" high with recessed top, drawn of .035 Type 305 stainless in one operation.

Box: 4½" wide, 4¼" deep, 4½" high, drawn of .040" 2S0 aluminum in one operation.

Jet aircraft detail: 8½" major dia., 4" high, drawn of .037" stainless in two operations. The complex profile of this part was obtained in the second operation by use of a segmented punch.

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You will save time and money from blueprint to finished sample. A discussion of Hydroforming with your engineering and manufacturing department executives may prove of inestimable value to your company. Call in a Cincinnati Milling field engineer. Bulletin M-1759-2 gives a description of the Hydroforming process and specifications of the five machine sizes . . . 12", 19", 23", 26" and 32". Write for your copy.

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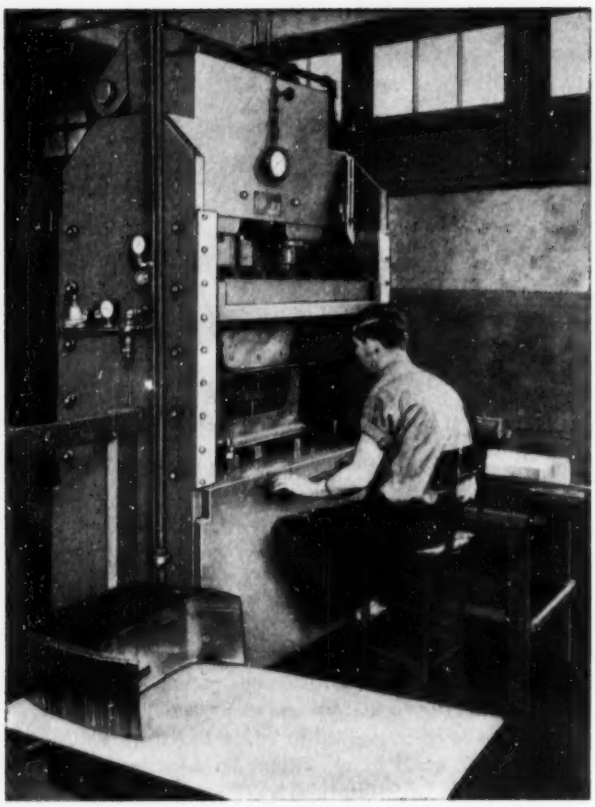

AND IT'S STILL GOING STRONG!

The headline tells the story! What more can we say? This KRW 150-ton Hydraulic Press is a mighty valuable piece of equipment at Liberty Steel Chest Corp., Rochester, N.Y. It's a motor-driven, 2-cylinder Press used for forming and deep-drawing work on tool and tackle boxes and roaster parts. Here is one more example of the rugged service and versatility you get in KRW Hydraulic Presses.

Let KRW help you with your pressing problems. Our engineers can show you how to save time and money in your shop with a KRW Hydraulic. We have a complete line of one, two and three cylinder models; 25-150 Ton capacities; hand, air or motor driven. KRW Presses are all self-contained above ground and give you maximum tonnage at any part of the stroke.

• Write for free illustrated brochures with detailed specifications and prices. Dep't. 11.

Maximum size Bed and Platen on 100 and 125 ton models—40" x 60"; on 150 ton models—36" x 60".

K·R·WILSON

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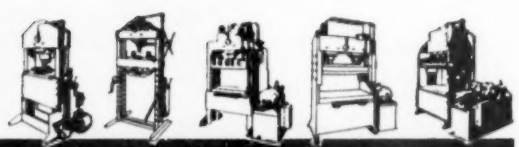

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

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Make a note to see KROSLOK, the newest development in face milling efficiency. Rigidity, simplicity and uninterrupted, profitable service... Only three members: body, blade, wedge. Two blade types: high speed steel and carbide-tipped. Diameters—3" through 18".

Ask on your letterhead for new Bulletin.

THE MOTCH & MERRYWEATHER MACHINERY CO.

Cutting Tool Manufacturing Division

Cleveland 13, Ohio

This is another of the "HUNDREDS OF JOBS" which can be done on a MARVEL Band Saw!

MARVEL BAND SAW saved these two 4400 lb. castings

Two sand cores washed out when these giant 4400 pound steel connecting rods were cast, resulting in solid eye ends without gaps. Then came the $64 question—how to machine out the 1½" slots in the longitudinal center of the eyes which were 22" high and had a wall thickness of 6½".

The Ernest J. Nelson Iron Works of San Francisco, did this "impossible" job easily, quickly and economically, without special tooling, on a standard Model #8M/2 MARVEL Band Saw. Two cuts were made in each rod in two hours per cut with tool cost of $3.06 per rod. The tool was a MARVEL B9-10 Band Saw Blade.

Every tool room, machine shop and maintenance department needs a MARVEL Series 8 Universal Band Saw—not only for innumerable everyday jobs but for the occasional "trick" operations, where its utmost versatility will save many headaches and dollars.

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These exclusive Marvel Features made this job easy.

1. Large, T-slotted work table.
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3. Power-Pressure feed.
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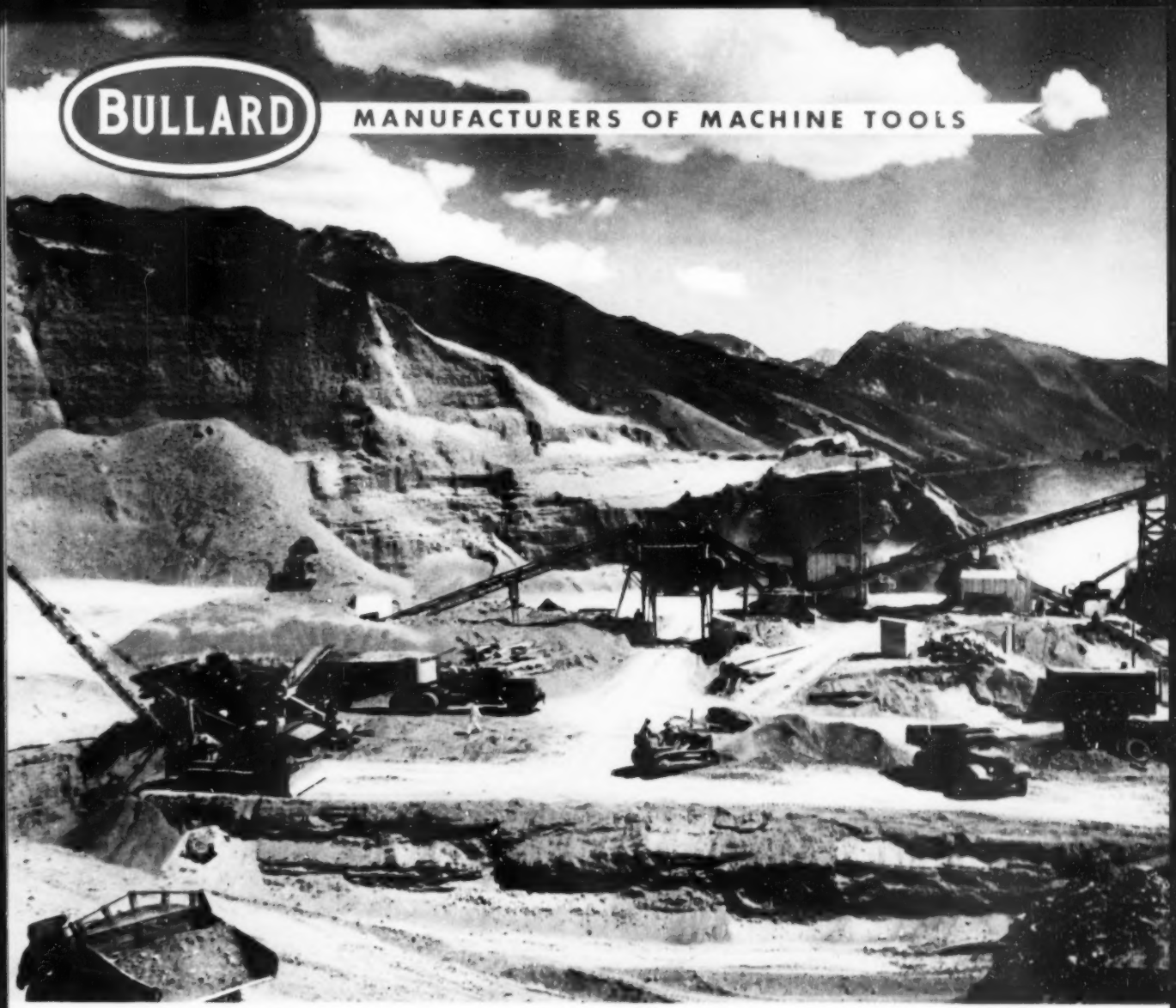

Operation of Huge Gravel Pit — Salt Lake City, Utah

Caterpillar Tractor Co. Photo

The Invisible Background of Industrial Progress

So common a sight is the well-known gravel pit that little importance is attached to the fact that it is one of the important natural resources essential to the building of highways, other grading projects, concrete structures, buildings, huge dams and bridges, dykes for flood control and flooded land reclamation.

In each of these and many other uses the competitive low cost handling from the gravel pit to the end use is dependent upon modern equipment — digging, transportation, grading, mixing or final placement. Such equipment is basically a product of manufacturing processes ★ dependent upon *Modern Machine Tools.*

Bullard has had years of experience in efficiently servicing the needs of producers of essential equipment which meet the growing economic needs of "The Invisible Background of Industrial Progress."

★ *For greater manufacturing economy REFER to next page.*

THE BULLARD COMPANY

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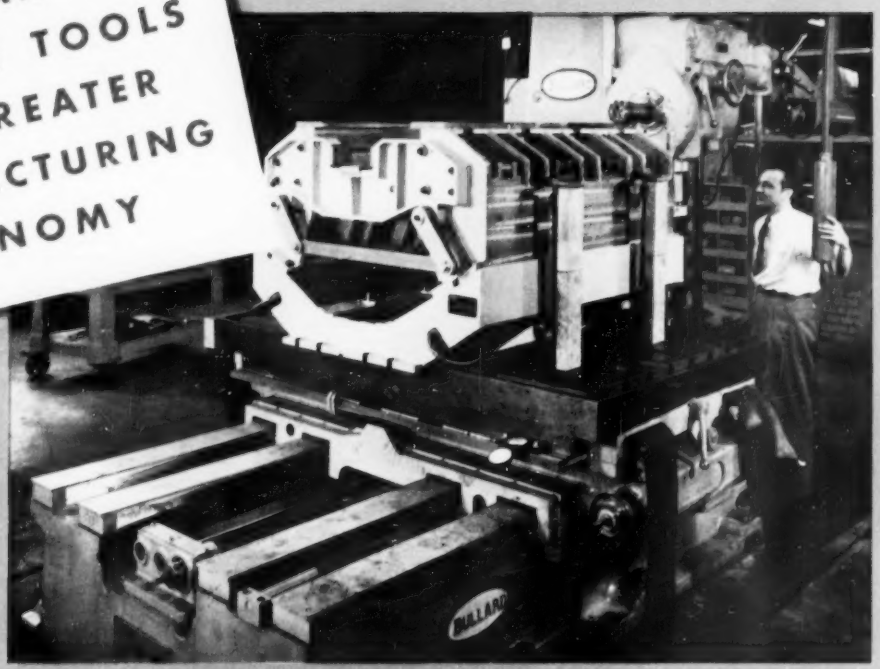
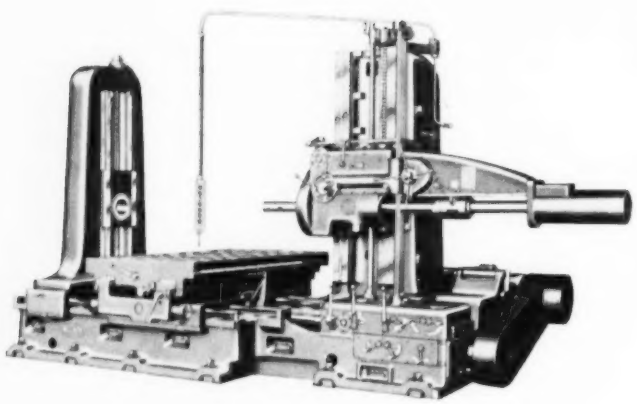
BULLARD MACHINE TOOLS FOR GREATER MANUFACTURING ECONOMY



For diversified performance plus utility, The Bullard Boring, Milling and Drilling Machine offers maximum accuracy and efficiency.



The 4-Way Bed on the Bullard 4 inch and 5 inch spindle Horizontal Boring, Milling and Drilling Machines provides rigid support for the table, permitting heavier work loads with a higher degree of repetitive accuracy.

These machines, built to exact standards of quality, have great productive ability and maintain a high degree of accuracy to meet any customer requirement, thereby reducing manufacturing costs.

Ask a Bullard engineer to explain the many features of this versatile and reliable machine — you'll be glad you did.

BULLARD

Time saved is money earned. Write now for information on Bullard Horizontal Boring Machines.

THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

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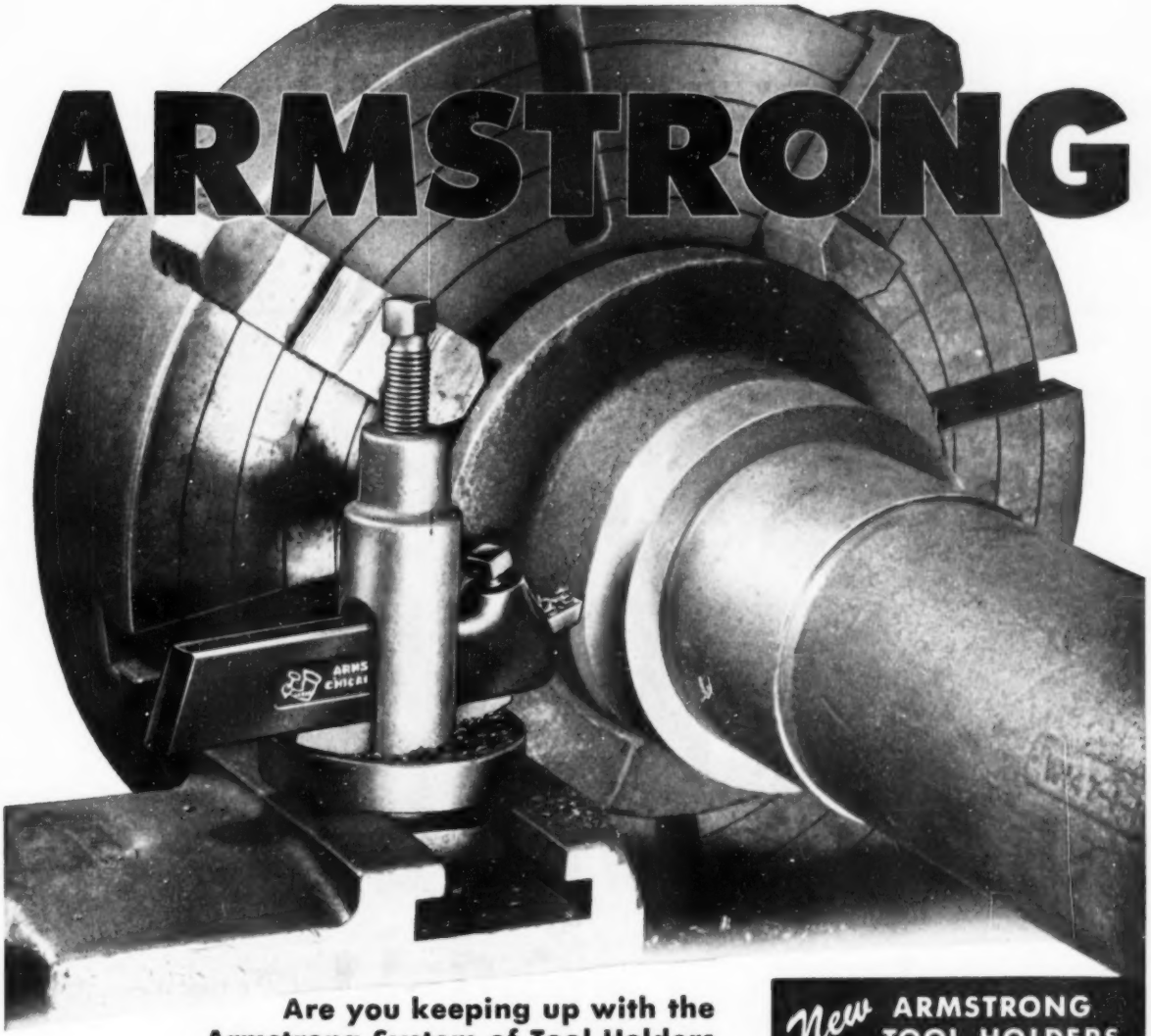

Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
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Here's Good News for

U·S·S Free-Machining

MX

is now available in OPEN HEARTH as well as BESSEMER

screw machine operators

The fact has been amply demonstrated that you can produce more parts per hour, that you can prolong tool life, minimize rejections, readily hold to tolerances and obtain better part finish by using MX screw stock.

In the past three years, the hundreds of shops that have put this faster-cutting bar stock into production have proved that MX will reduce the cost of *any* part by out-performing ordinary screw stock.

Such cost savings have averaged between 10 and 15%, sometimes ran as high as 40%. Today, you can confidently count on still bigger savings by using this steel.

And make a note of this. Now MX is also being produced in our Open Hearths to give screw machine operators a freer-cutting steel of the C-12XX type. This steel, especially controlled to improve cold-drawing characteristics, assures users of a fast-cutting bar stock not only of *excellent* surface quality but one that performs exceptionally well when finish-machined parts must be subjected to crimping or other deforming operations.

U·S·S Free-Machining MX—either Open Hearth or Bessemer—is available in all the popular bar sections and sizes. You can obtain it in cold-finished form from your regular supplier as "MX" or under his own identifying trade name. In hot rolled form, MX is available direct through our nearest district sales office.

USS

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UNITED STATES STEEL

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New ROSS "Water-Saver" Valve CUTS COOLANT COSTS!

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Now waste of expensive coolants can be eliminated . . . their use confined to required periods!

The Ross "Water-Saver" or Time Delay Valve is the answer. It turns on the coolant and lets it run when needed . . . then automatically shuts it off. The flow can be maintained for any period from 3 seconds to 3 minutes after the machine cycle.

Operation of the valve is entirely automatic. No electrical or mechanical motivation is required since it is activated by cylinder pressure.

The Water-Saver Valve is a straightway or shut-off model, normally open or closed to water supply, and is available in ¼ to 1¼ pipe sizes.

Get complete details today . . . no obligation whatsoever.

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Ross makes valves and . . . hundreds of types and sizes. Take advantage of the experience gained in over a quarter century of concentration on control and application of air power!

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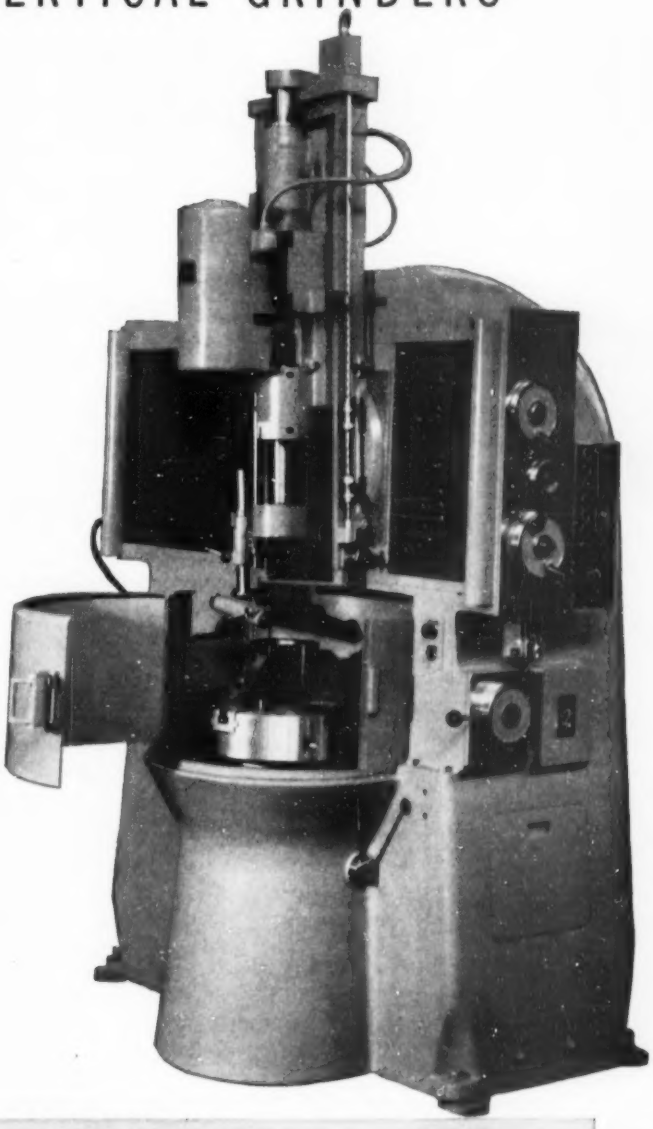
Consider these 3 OUTSTANDING Advantages of SPRINGFIELD VERTICAL GRINDERS



ALL SLIDEWAYS ABOVE GRINDING WHEEL

protected from abrasive dust and grit . . . LONGER LIFE.

NO GRAVITATIONAL PULL

to throw work out of line. Work sets solidly on vertical spindle . . . GREATER ACCURACY.

EASE OF OPERATION

All controls conveniently located at normal height; greater work visibility; easier loading . . . HIGHER PRODUCTION.

PLUS the added advantage of GREATER VERSATILITY

Grind combinations of O.D., I.D., faces, tapers, shoulders or steps with one set-up. Hold extremely close related tolerances.

Springfield Vertical Grinders are thoroughly proved by 14 years of time-saving, cost-saving precision production. Various capacities to 42" swing x 24" hole depth.

Write for Catalog 183

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

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EXCLUSIVE REPRESENTATIVES IN ALL PRINCIPAL CITIES

In die cushions, too, BLISS builds more types and sizes than any other company...

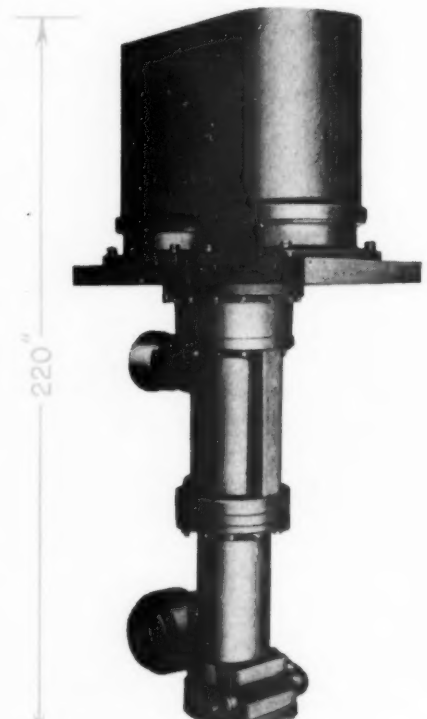
Bliss-Marquette Die Cushion Engineering Ranges from Standard "A" and "C" Types for Punch Presses to large Specials like this Hydro-Pneumatic

The *right* die cushion for a given application can make a lot of difference in press operation. That's why Bliss engineers have created a multitude of types and sizes to suit individual situations. Bliss designs have demonstrated their effectiveness over many years by...

- ***Permitting deep draw operations at low cost***
- ***Eliminating operations***
- ***Prolonging die life***
- ***Reducing spoilage***
- ***Preventing excessive strains***
- ***Adding another action to presses***

Since these cushions can eliminate many difficulties and make possible substantial savings, *all Bliss S-1, S-2 and Inclinable presses are designed and machined to accommodate them.* Bliss cushions are easy to install, easy to maintain and easily adjusted for work involving any pressures within their capacities.

Bliss builds die cushions in a large number of types and sizes to meet practically any possible condition. You're likely to find the cushion to suit your particular need in Bliss' 60-page Reference Book on types, uses and care of die cushions. Write for your copy.



E. W. BLISS COMPANY, CANTON, OHIO

E. W. Bliss (England) Ltd., Derby, England

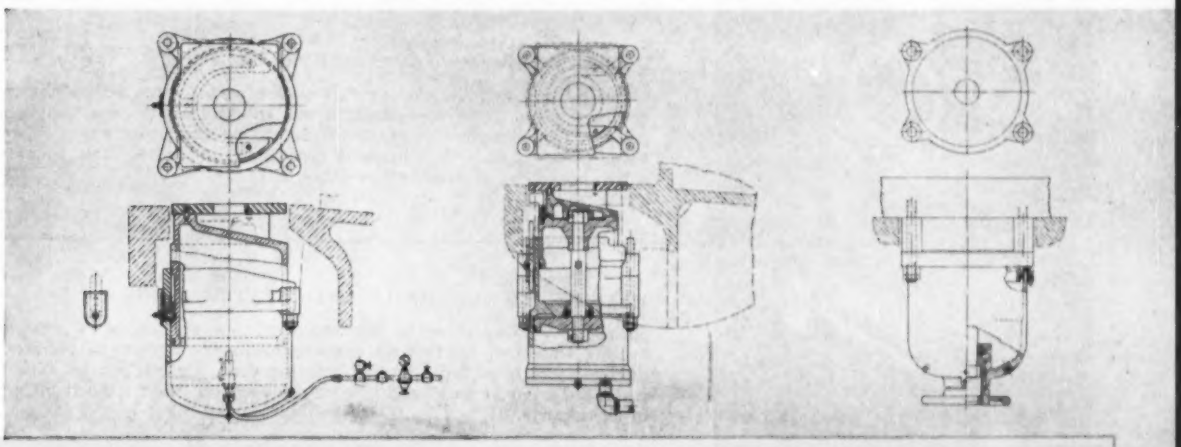
E. W. Bliss Company (Paris), St. Ouen sur Seine, France

U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan
Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other dealers in United States cities and throughout the world.

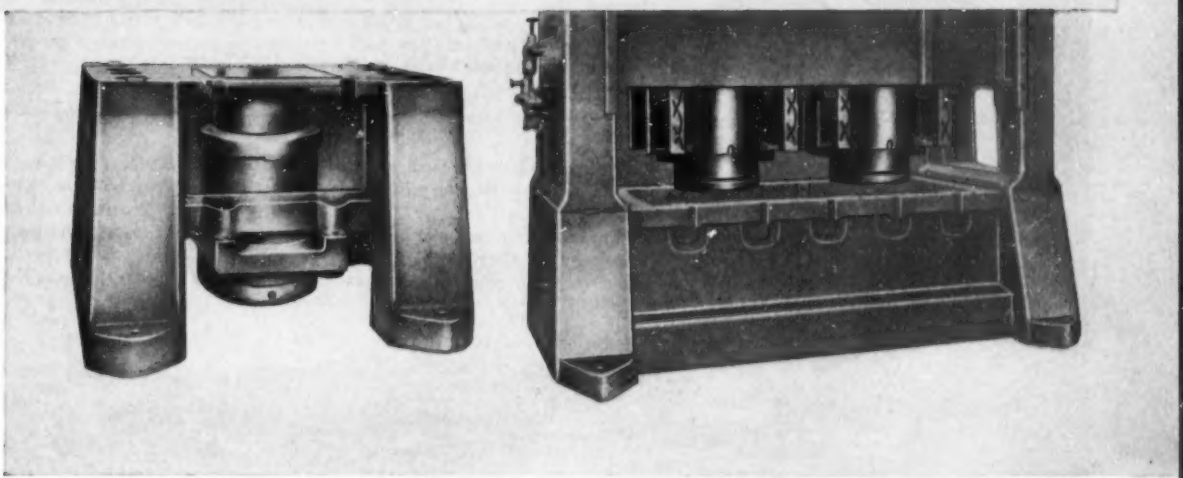
Remember: **for DIE CUSHIONS, Presses,**

FOR INCLINABLE PRESSES Bliss makes a complete series of pneumatic cushions; Type CO (left), requiring no tank for standard strokes; Type CCO (center), requiring a tank only when stroke is over 2", similar to Type CO but with two pistons and cylinders to deliver greater pressures; Type GA (right), having a hollow piston shaft for easy slug removal, self-contained for strokes up to 1".

Note that Type CO and CCO cushions are arranged with openings in the pressure pad to suit the job so that slugs or scrap may be dropped through the die.



Why these Bliss-Marquette Die Cushions for inclinable and straight side presses can improve press room efficiency

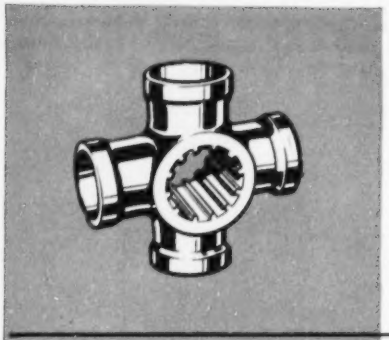


FOR S-1 PRESSES Bliss recommends Type CC cushions which feature extra long internal guides to prevent side movement or weaving of the pressure pad. Locking devices can be furnished.

FOR S-2 PRESSES Bliss recommends Types C and CC cushions. The compact design of Type CC permits installation of a double cushion that will draw up to 8".

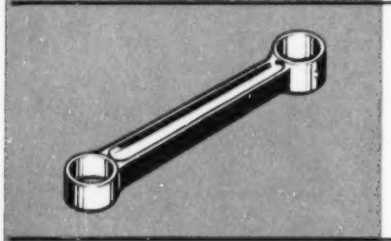
Rolling Mills, Special Machinery...

It's Bliss



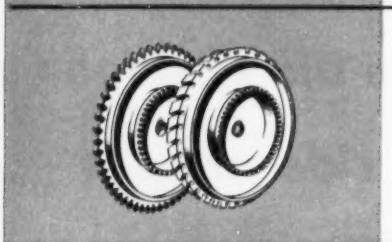
DETROIT BROACH TOOLS PROPELLER HUBS

Detroit Broach tooling for aircraft engine parts began with reciprocal engine designs. A typical example was the Detroit Broach tooling to produce the spline inside propeller hubs. In one pass, broaching produced a complete spline with consistent accuracy. This led to more accurate spline broaching in many other fields, too.



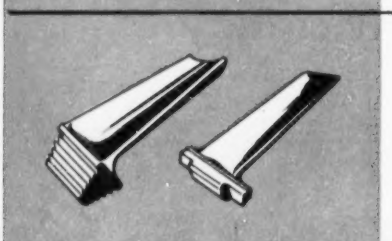
DETROIT BROACH TOOLS ARTICULATING RODS

As radial engines came to the forefront, new challenges in precision tooling were met by Detroit Broach ingenuity. Typical of reciprocal engine parts broached were articulating rods. Detroit Broach tooling produced a better finish and greater accuracy on the machined surfaces of these parts.



DETROIT BROACH TOOLS TURBINE AND COMPRESSOR WHEELS

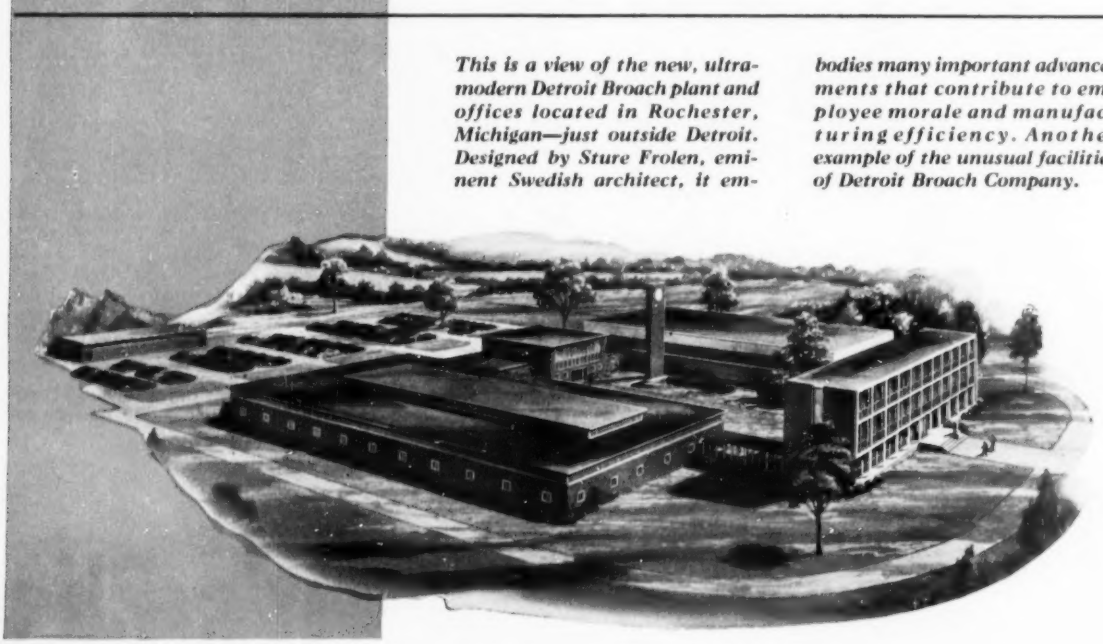
With the advent of jet engines, the need for close-tolerance repetitive accuracy was even more acute. In addition came the problem of working with high-alloy, heat-resistant, tough-machining metals. Compressor and turbine wheels are typical of the parts for which Detroit Broach tooling is meeting all requirements with flying colors. Varied forms of slots are produced in these wheels, square, at helix and at conical angles to the axis.



DETROIT BROACH TOOLS TURBINE AND COMPRESSOR BLADES

Mating parts to compressor and turbine wheels, the compressor and turbine blades are two more parts on which Detroit Broach tooling turned the trick. Intricate "Christmas Tree" forms, dovetail and "Ball Root" forms are easily produced with accuracy. At the same time, production costs are rock-bottom and surface finishes generally need no further machining.

This is a view of the new, ultra-modern Detroit Broach plant and offices located in Rochester, Michigan—just outside Detroit. Designed by Sture Frolen, eminent Swedish architect, it embodies many important advancements that contribute to employee morale and manufacturing efficiency. Another example of the unusual facilities of Detroit Broach Company.



Broaching Pioneers

IN THE AIRCRAFT INDUSTRY

Since the price of poor fits on engine parts may be paid in human lives, the aircraft industry was quick to recognize and adopt the inherent accuracies of broaching.

It was quick, too, to recognize the ability of Detroit Broach to engineer and produce tooling that met the need for concise repetitive accuracy . . . tooling with important production economies as shown on the opposite page.

in YOUR industry, too you will find many examples of Detroit Broach tooling that is producing repetitive accuracy, part after part after part. Just as important, it is tooling that consistently makes good common sense in terms of efficient operation and rock-bottom cost-per-piece broached.

These benefits that accrue Detroit Broach customers are not achieved by magic or by gift. They are the result of years of specialization in one important field . . . broaching. Every person, every machine, even plant facilities at Detroit Broach are geared to that single purpose.

In broaching it will pay you, too, to have a talk with Detroit Broach Company . . . pioneers in broaching yesterday, today, and tomorrow.

Detroit Broach **COMPANY**

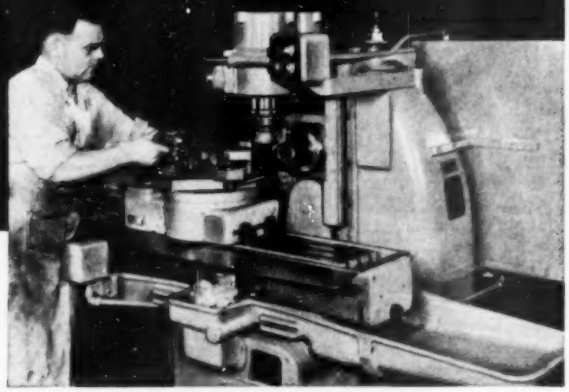
ROCHESTER, MICHIGAN

OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Here's what can be done with Standard Rigidmils...

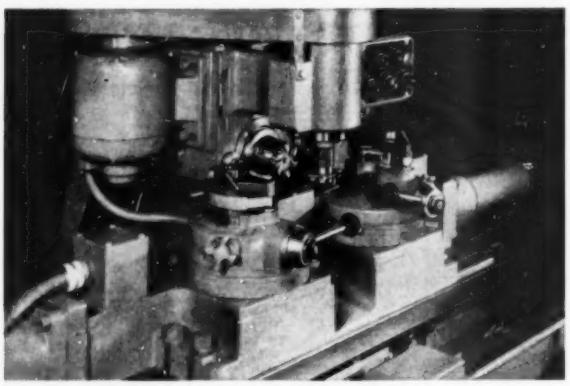
TO SOLVE SPECIAL MILLING PROBLEMS

On standard Sundstrand Rigidmils, the head is a self-contained unit which can easily be replaced with a special head. Consequently, when production or work requirements permit machining several surfaces simultaneously, the standard head can be replaced with a special head, and a *special* job done with the lowest possible capital investment. Furthermore, putting into effect product changes (a difficult problem for many production engineers) doesn't worry anybody in plants where Rigidmils are installed. As these machines can be converted so readily to meet production changes, they represent a combination of maximum production with minimum capital investment. Here are six good examples of standard Rigidmils "engineered" to a production job with "only the head as special".



Special 2-Spindle Head Mills Top and Side of Part Simultaneously

This standard Sundstrand Rigidmil has a special head with one vertical and one horizontal spindle for milling two surfaces of refrigerator cylinders in one automatic cycle. Additional production is obtained by the two indexing fixtures, which permit loading of one part during the milling of another. Production is 150 parts per hour.

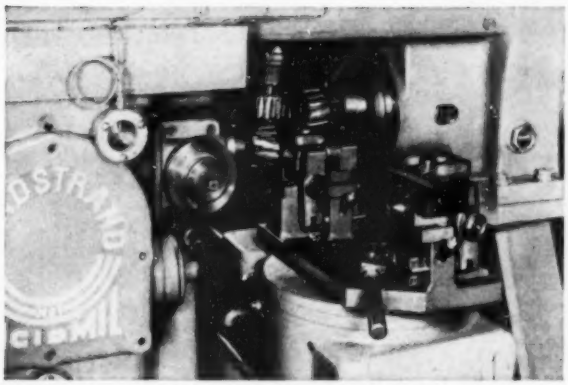


Face Milling and Slotting With Special 2-Spindle Head

This Sundstrand Rigidmil is provided with a special high speed head equipped with one vertical and one horizontal spindle. Each spindle has endwise adjustment, and horizontal spindle is provided with automatic retraction. Two power-operated rotary tables are timed and interlocked with the automatic table cycle for rotary milling of the face and slot in washing machine brake shoes. Manually clamped fixtures hold the part for a cycle of load and unload at one end while milling at opposite end. Production is approximately 145 per hour.

SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

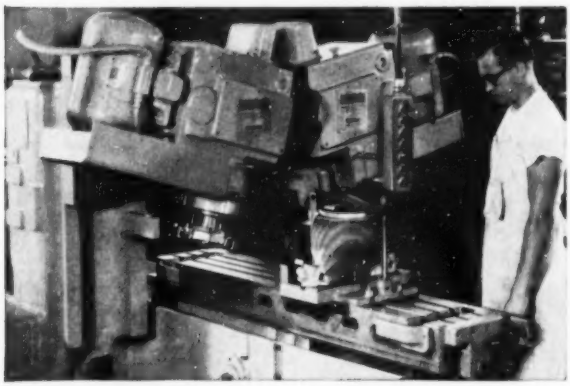


Three Sides of Part Milled Simultaneously With Special 3-Spindle Head

The standard Rigidmil above has a special head with one vertical spindle and two opposed horizontal spindles offset vertically. The top and both sides are milled in one automatic cycle. Not only are operations saved, but the three surfaces are held in accurate relation to each other. Again, automatic indexing of fixtures provides free loading time and helps obtain the production of 172 pieces per hour.

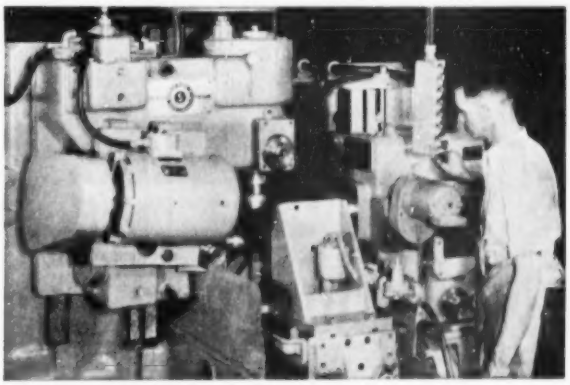
Straight and Woodruff Keyways Milled With Special 2-Spindle Head

Here's a standard Sundstrand Rigidmil "tooled" for a special keyway milling job. It is provided with a regular horizontal spindle head for milling a straight keyway and an attached pivoting head for milling a Woodruff keyway. Both keyways are located in one end of the crankshaft and both are milled simultaneously. Keyways are held in definite relation to each other by milling both in same setting of crankshaft.



Duplex Rigidmil Has Two Special Heads for Angular Milling Operations

This Sundstrand Duplex Rigidmil is equipped with two special heads for angular milling on aircraft cylinder heads. With workpiece inverted in fixture, the milling heads, one set at 10° and the other set at 15°, mill both rocker bosses simultaneously. The machine operating in automatic table cycle of rapid approach, feed and rapid return completes 64 cylinder heads per hour.

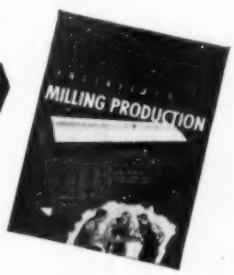


Duplex With One Special 2-Spindle Head Mills 3 Surfaces Simultaneously

A special two-spindle head is mounted on the left hand column of this standard Sundstrand Duplex Rigidmil. One is a vertical spindle and the other is set at 5° from horizontal. The right hand column carries a standard horizontal head. Pads on both sides and top of transmission cases are milled in automatic cycle at the rate of 67 pieces per hour.

Free Data

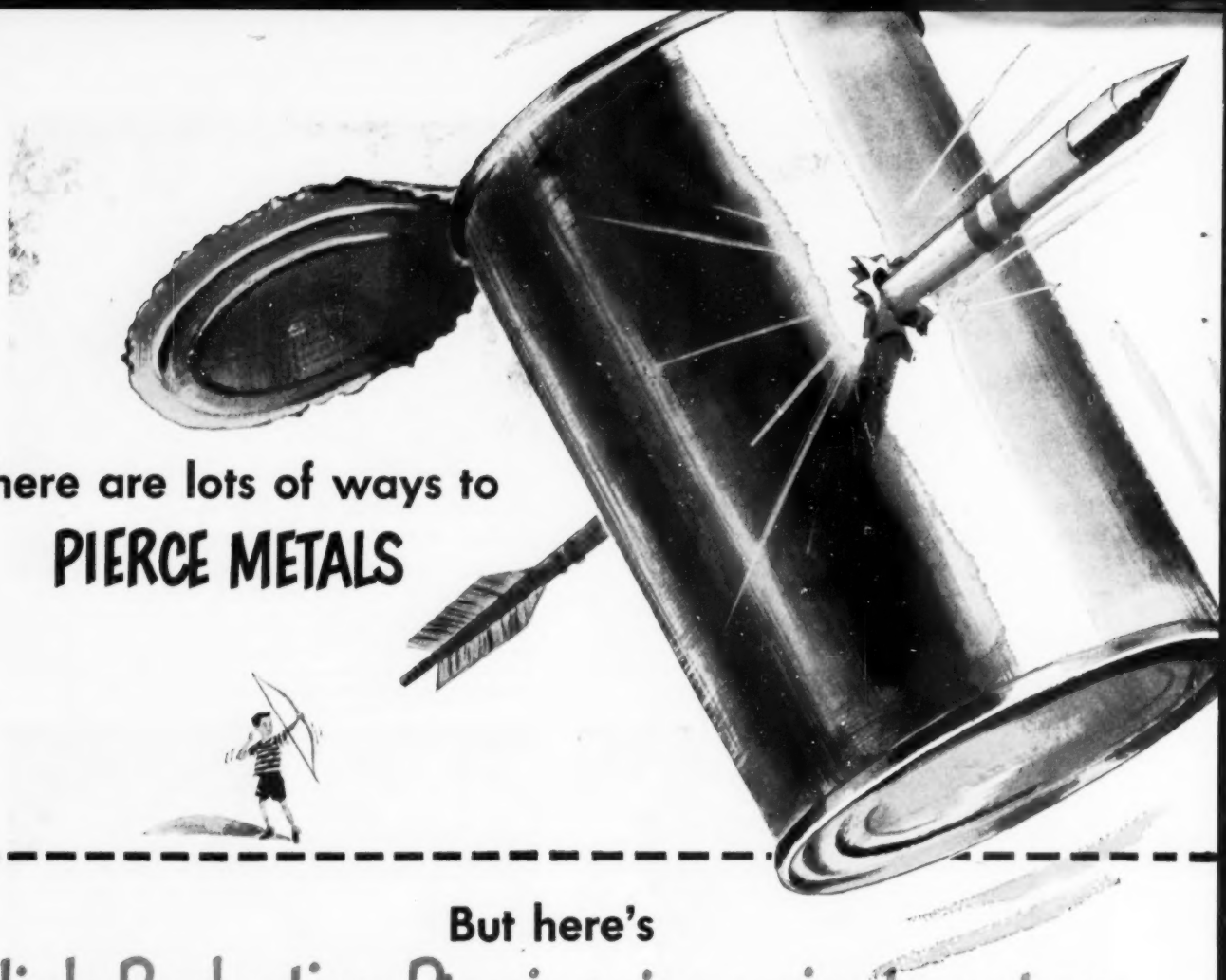
Write for more proof of the successful application of Sundstrand "Engineered" milling production. This new 40 page book contains over 35 actual problem solutions together with interesting tooling diagrams. Write for your copy today. Ask for Bulletin No. 128.



SUNDSTRAND

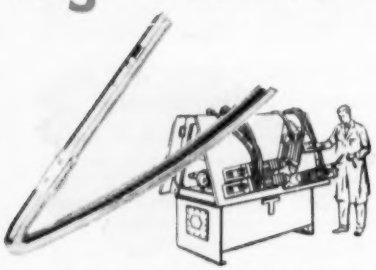
SUNDSTRAND
Machine Tool Company
2533 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES



There are lots of ways to PIERCE METALS

But here's High Production Piercing in a single set-up

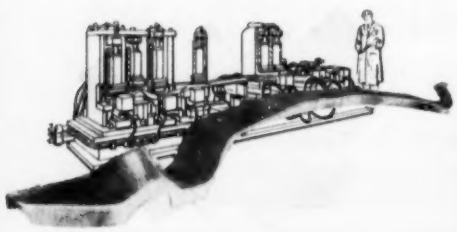


Seven irregular holes and two trimming operations complete this car door inner window frame in one setup. Model changes can be made at low cost.

DANLY HYDRAULIC METALWORKING EQUIPMENT

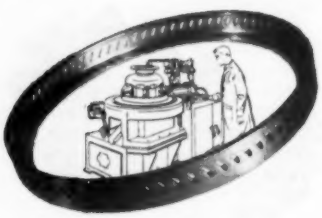
Now you can pierce multiple holes of practically any type—round, oblong or irregular—to very close tolerances in a single setup. Capacity of Danly Metalworking Equipment can be as high as 225 tons per hole with break-through shock practically eliminated. Each station hydraulically strips its punch, greatly simplifying fixturing. Custom-built for your piece part, Danly Hydraulic Metalworking Equipment enables you to pierce more holes faster and more accurately—in one operation.
Write for the special bulletin shown at right today.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



More than 40 holes in this automotive frame member are pierced simultaneously on a Danly machine built expressly for this purpose.

DANLY®
HYDRAULIC METALWORKING EQUIPMENT
MECHANICAL PRESSES
. . . 50 TO 3000 TONS

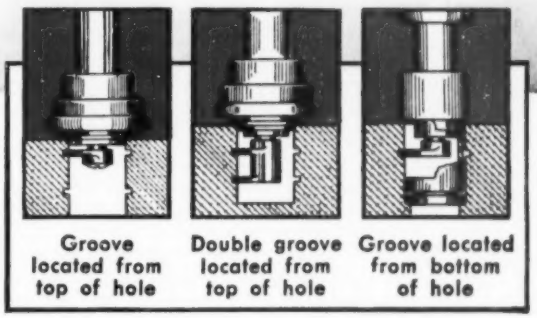


Irregularly shaped holes are pierced in this stainless steel jet engine part to very close tolerances—automatically.

Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



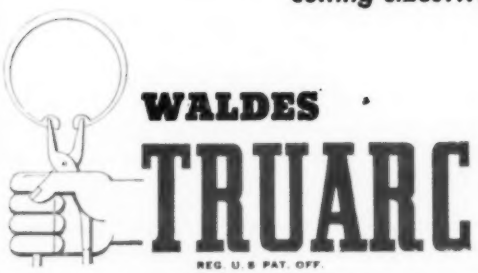
Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for new 12-page Catalog giving mechanical details, cutting sizes...extra features...full information



WALDES

TRUARC

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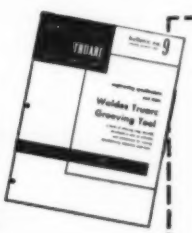
GROOVING TOOL



WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place
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Please send me your new 12-page Catalog on Waldes Truarc Internal Grooving Tool.

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The Reader AUDITED PAID ABC CIRCULATION *His Mark*

THE ABC that appears in the symbol at the top of this page stands for Audit Bureau of Circulations. The symbol itself is an emblem of cooperation, in which every subscriber to this magazine has an interest.

The Audit Bureau of Circulations is a voluntary, non-profit, cooperative association. It was founded in 1914 and now consists of 3450 advertisers, advertising agencies and publishers in the United States and Canada. This magazine is proud to be a member.

ABC originally was set up to help take the racket out of publishing, to eliminate the waste and guesswork then so prevalent in publishing and advertising, to establish order and confidence in place of the misunderstanding and misrepresentation that arose from unverified circulation claims and dubious circulation practices. Its mission was to protect the interests of both readers and advertisers.

THIS IT DID by first defining the term "paid circulation." Then it established standards and rules to govern subscription sales practices and records. Finally it set up an auditing organization to verify the claims and report the facts concerning the circulation of each member publication. It now maintains on that job a working staff of sixty-five full-time auditors. So the ABC symbol has become the hallmark of circulation standards and advertising values. Each member publication must maintain those standards if it wishes to retain its membership and display the ABC symbol.

This ABC audit is no perfunctory affair. When a business publication, such as this one, becomes a member of the Bureau, it agrees that the auditors shall have "the right of access to all books and records." Their inspection, therefore, may cover any part of its operations. Original subscription orders, payments from subscribers, paper purchases, postal receipts, arrears of payments, and many more items are painstakingly checked by the auditors. In many instances they go behind the records to seek verification from subscribers themselves as to the terms of their subscriptions.

IN DOING ITS JOB, ABC has created many values for both publishers and readers as well as for advertisers. That is because the publication that becomes a member of ABC thereby offers the strongest possible guarantee of its primary devotion to the interests of its readers. The function of a business magazine is to be useful to its readers. When this service is rendered by an ABC publication, it is constantly subject to the practical test of reader acceptance and approval. As each subscriber has the right to purchase or refrain from purchasing an ABC publication, that collective right confers upon the readers the power to say whether or not the publication will survive. Thus the report on its ABC audit provides the most direct assurance that a publication stays in business only because of a voluntary demand by readers who find its editorial service responsive to their needs.

Naturally, the editor of each business publication follows closely the score thus racked up by his paper in its ABC reports. In the scope and tone of his editorial coverage and treatment, in the selection and presentation of his editorial content, he must constantly labor to maintain and enhance the readers' acceptance of his efforts. That is why the editorial standards established by ABC publications set the editorial standards for all publishing. That is how the ABC constantly stimulates its member publications to become even more useful to their readers.

AND THAT IS WHY the ABC symbol has become the Mark of the Reader, a constant reminder that his willingness to pay for an ABC publication is the acid test of its value both to him and to its advertisers.

McGraw-Hill Publishing Company

Pressure Processing

. . . whoever uses it in their production is a customer or potential customer of **H-P-M**

600 DRAWS AN HOUR!

The cup of the Revere whistling teakettle is drawn at the rate of 600 per hour on a standard H-P-M 150-ton Pot and Pan press.

Cupping, clipping, beading, tapering and other forming operations at the Rome Manufacturing Company, division of Revere Copper and Brass, Inc. are all handled on dependable H-P-M All-Hydraulic Fastraverse Presses at phenomenal speeds.

If you have a pressure processing application, it will pay you well to talk shop with an H-P-M engineer. Write today.

HPM

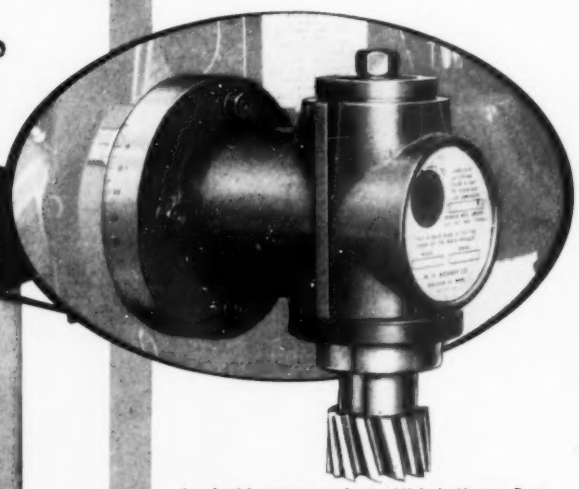
THE HYDRAULIC PRESS MFG. CO.

1002 Marion Road, Mount Gilead, Ohio, U. S. A.

Presses for Every Pressure Processing Application

THE *Nichols* TOOL ROOM MILLER

"the miller that uses its head!"



A valuable accessory is the Nichols Heavy-Duty Vertical Milling Attachment. Takes full 1½ H. P. up to 2000 R. P. M. (So precise, some shops use it for jig boring!)

The unusual versatility and extra capacity of this model make it extremely useful for the tool room. Because it is equipped with the "rise-and-fall" spindle, it can perform not only conventional precision milling, but also facing boring, key seating, contour milling and other operations. Both longitudinal and transverse feed screws are fitted with hand wheels and extra-large adjustable micrometer dials with easy-to-read graduations. This model is especially useful because of its compactness, generous capacity and ability to handle a wide variety of work to close tolerances —*to "tenths" when desired!*

CONDENSED SPECIFICATIONS

Table Working Surface	8½" x 30"
Longitudinal Travel	19"
Transverse Travel	7"
Vertical Travel—Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R. P. M.	
Weight	1250 lbs.

Write today for Nichols general catalog which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?

MANUFACTURED BY W. H. NICHOLS COMPANY • WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

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SCENE 96:
"Accuracy Counts!"
... an actual scene from the GTD-Greenfield sound film "FACTS ABOUT TAPS AND TAPPING"
VOICE: "Good gaging technique is essential to insure interchangeability of threaded parts ... Here we see a plug gage used to make sure that threads are held within the GO and NOT GO limits set by the designer ... It pays to use guaranteed accurate gages ... Remember, a poor gage that rejects good products is an expensive tool."
GREENFIELD
TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
This 26-minute full-color motion picture "FACTS ABOUT TAPS AND TAPPING" is now available for group showing through your local GTD-Greenfield distributor.

FINE THREADS . . . LARGE DIAMETERS

The GEOMETRIC C Die Head has an unusually large bore for the size of the head, to accommodate relatively large work. The smaller, less expensive chasers permit threading fine pitch work more economically.

The Inside Trip (one of three available types) is ideal for work where length of thread must be uniform but where the pieces cannot be chucked uniformly.

Also available, Pull-off Trip and Outside Trip.

Write for full details. Specify Bulletin C

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

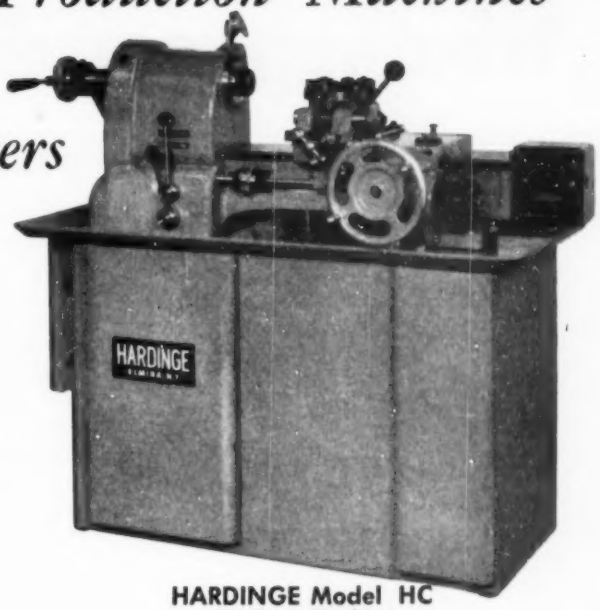
NEW HAVEN 15, CONNECTICUT

GEO MET RIC

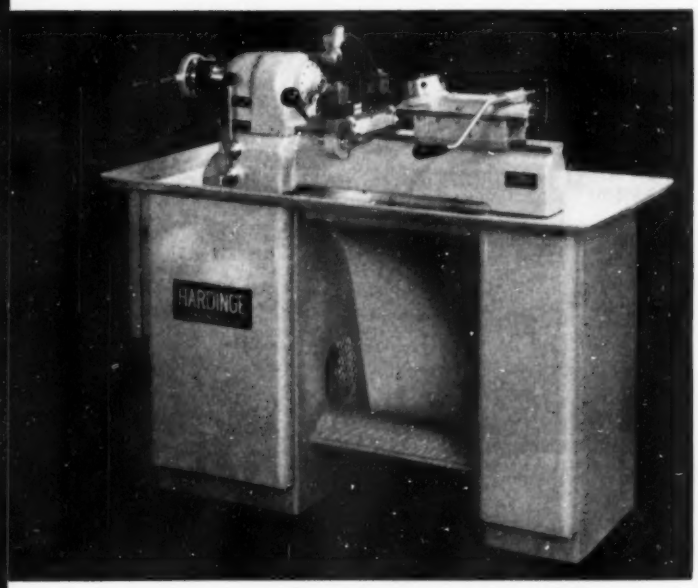
HARDINGE
ELMIRA, N.Y.

Precision Production Machines for Aircraft Manufacturers

THERE is a widespread general acceptance of these machines as being capable of meeting the extreme accuracy requirements of the aircraft industry. They combine high speed, accuracy, ease of operation, and low initial cost. This means tool room accuracy, better part finish and low cost production. These fast-action machines are cutting costs on jobs which were usually allotted to large, slow and expensive machines.



HARDINGE Model HC
Chucking Machine
Collet capacity 1", Chucking capacity 6", Swing 13"

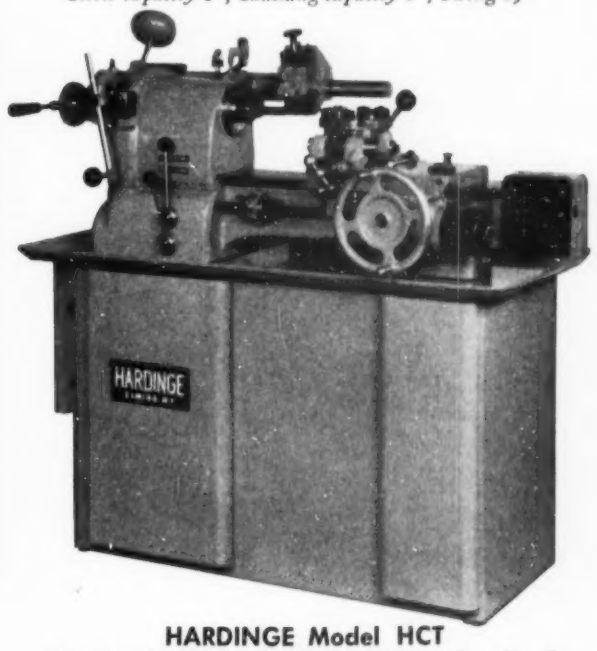


HARDINGE Model DSM 59
Second Operation Machine
Collet capacity 1", Chuck capacity 6"

The Hardinge Second Operation Machine is a time-tried production machine, easy to set up and relatively inexperienced operators can turn out parts rapidly to close tolerances and fine finish.

The extreme accuracy and high speed of this machine enable you to chuck partially finished parts and to rapidly do close tolerance turning, forming, boring, drilling,threading and facing.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE



HARDINGE Model HCT
Chucking Machine with Production Threading Head
Collet capacity 1", Chucking capacity 6", Swing 10",
Internal and External Threading up to 6"

Hardinge Precision Chucking Machines can finish diameters, shoulders, end faces and cut precision threads in *one setting—all concentric* with each other.

Everyone responsible for the machining of precision parts appreciates the value of machines which can be quickly and inexpensively tooled. These Hardinge machines can be tooled with standard tool bits for fast production of precision parts.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

Whether your dies are simple...

you can speed production, save time and money,

1 Simple pierce and cutoff die, designed for Electric Auto-Lite Co., Toledo, operates at speeds faster than 400 strokes per minute. Die has produced over 2,000,000 strokes . . . and still does not require resharpening.

Actual performance records prove carbide dies effective over wide range of uses

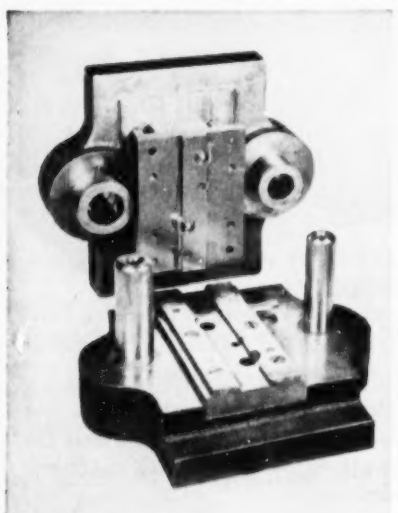
ACTUAL plant performance has proved how easy and profitable it is to use Carboloy cemented carbide over a wide range of applications. For blanking, forming, drawing and piercing . . . for large or small, simple or complex dies . . . only carbides will give you benefits like these:

- **Production runs 35 times greater than steel (see picture No. 7)**
- **Over two million high-speed strokes . . . without needing resharpening (see picture No. 1)**
- **Accurate tolerances held for months . . . compared to days with steel (see picture No. 6)**

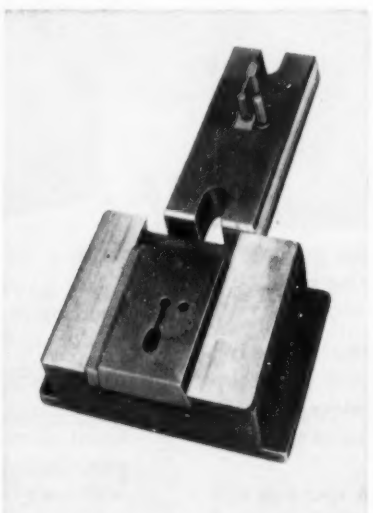
Read the case histories on these pages. They are but a few from the wide range of carbide press-die applications. Then explore the possibilities of carbide in your press dies. Carboloy personnel and services will give you or your die maker every possible assistance.

If you wish, a Carboloy Sales Engineer will call at your plant, without obligation. He'll show you how simple it is to apply and maintain carbide dies; how to get increased production with fewer rejects. Or, you can send your key personnel to the Carboloy Training School in Detroit.

Also, you can get free Carboloy Die Engineering Manual D-124. It shows you how easy it is to design, apply and maintain carbide dies. Get all these free, profit-building Carboloy services by mailing the coupon at right.



2 Simple progressive washer die, used at Precision Spring Company, Detroit, Michigan, pierces and blanks spring-tempered steel washers. This die delivers several million hits per sharpening.



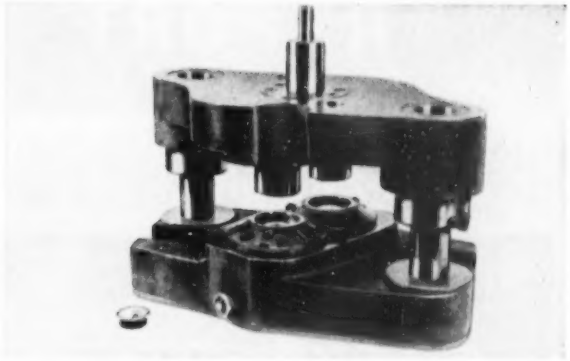
3 Notching die, wearproofed with Carboloy cemented carbide, stands up under severe day-after-day pounding. Because carbide wears 10 to 50 times longer than steel, maintenance costs are lower.

4 Piercing die, made for E.M.F. Dordt, Holland, was designed to pierce a small stator in 24 places. When dies have been wearproofed with cemented carbide, production increases, downtime decreases.

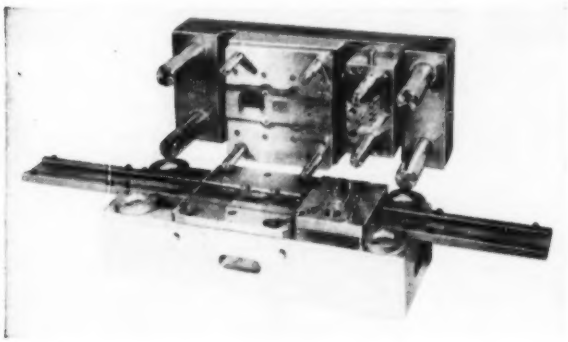
or whether they are complex

by equipping them with CARBOLOY®
CEMENTED CARBIDE

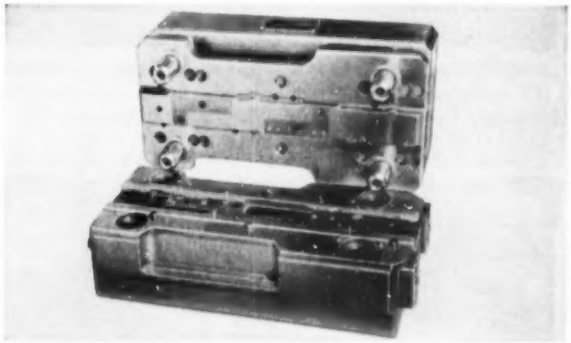
5 Single notching dies, also made for E.M.F. Dordt, Holland. Special design permits details to be interchanged on the same shoes to take full advantage of the carbide in short-run production.



6 Blanking and drawing of screw bottle caps is done by this die for Armstrong Cork Company, Lancaster, Pa. Die operated accurately on material .006" thick for months. Steel die had to be changed each week.



7 Lamination die made for Schick, Inc., produces rotor and stator laminations of motor-grade silicon steel. Customer reports carbide die produces average runs 35 times as long as steel dies.

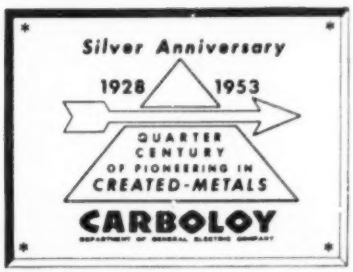


8 Lamination die punches two, high-silicon "L" laminations per stroke. Dies of this type are in use throughout the metal-working industry, outwearing and outproducing steel dies time and again.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

FILL OUT THE COUPON . . . MAIL IT TODAY!



CARBOLOY Department of General Electric Company
11149 E. 8 Mile Ave., Detroit 32, Michigan

- ☐ Rush me free Carboloy Die Engineering Manual D-124
- ☐ Send complete details on free Carboloy Training School
- ☐ Have a Carboloy Field Engineer call at my plant

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Soluble Oil

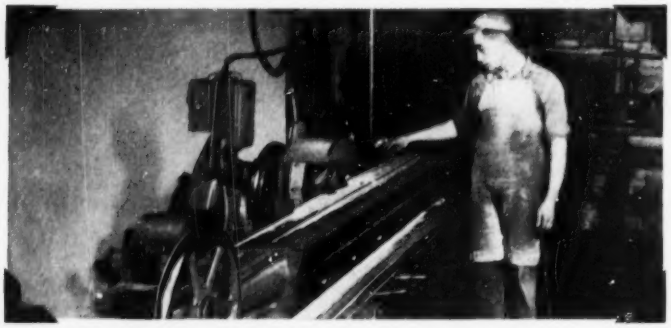
TOOL Precision grinder

LUBRICATOR Circulating flow onto work

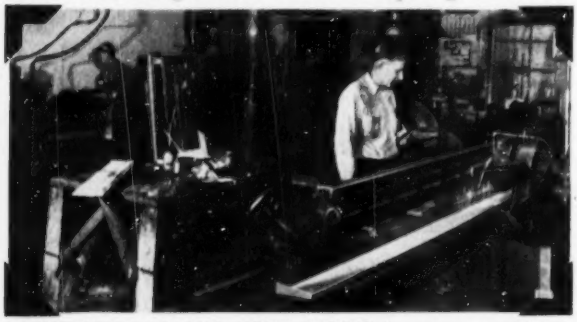
SERVICE Grinding paper-cutting knives

FIRM Sharpe & Company, Los Angeles

Highly stable oil ends separation and rust problem!

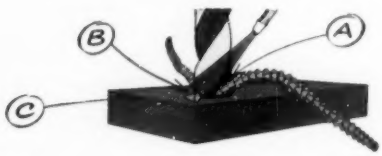


CALOL SOLUBLE OIL was the answer to many problems on this precision grinder, used by Sharpe & Co., Los Angeles, for sharpening paper-cutting knives. Other oils tried turned rancid, separated in storage, and allowed rusting on the razor-sharp edges of finished blades. But when a mixture of only one part Calol Soluble Oil to 63 parts water was used, it remained stable under all conditions, prevented rusting, and held deposits on grinding wheel to a minimum. (Above) Hand-honing blade after grinding.



SHARPENING HARD TOOL-STEEL KNIVES for paper-cutting machines all over the West, Sharpe & Co. has used Calol Soluble Oil for more than three years. Owner Eldon Buntin says, "We have had no trouble of any kind since using Calol Soluble Oil. It doesn't separate or permit rusting like other oils we've tried and has never produced a bad odor."

How to up efficiency in all metal-cutting operations



Use the correct Calol Cutting Fluid for any operation from grinding to broaching. Recommendations for each are made from actual working results.

A. Have high cooling and lubricating qualities—minimize "built-up edge" and promote good finish.

B. Flush away cuttings readily.

C. Protect machine and work against rusting and corrosion.

FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, is ready for you. Write or ask for your free copy today.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

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We've put a new roof over an old part of our business

Now—with new, expanded facilities—we can offer you immediate help with your unusual metalworking problems, big or small

THOUGH we've been designing and building standard and special machine tools and tooling since 1898, limited production facilities for special machines have prevented us from offering these services on a wide scale.

But now, our Special Machinery Division has new and greatly expanded facilities. Its exclusive job will be to build special machine tools and tooling or to specially adapt standard equipment to solve specific metalworking problems.

Check our qualifications:

EXPERIENCE: We've been in the business 55 years. In addition to being one of the country's leading producers of standard milling machines . . . *our annual production of special machinery has ranged up to $3,000,000.*

FACILITIES: The new Special Machinery Division plant, built on a 38-acre site, is equipped with more than *$2,500,000 worth of new tools and equipment.*

PERSONNEL: The Special Machinery Division engineering section has nearly 100 experienced design and production engineers at its command. These men specialize in applying the latest developments in mechanics, hydraulics, electronics, metallurgy and allied fields to metalworking. In addition, it has a full complement of experienced machinists and mechanics needed for special machine construction.

PERFORMANCE: Kearney & Trecker's Special Machinery Division is best recommended by its record of successfully solving hundreds of unusual machining problems. These solutions required provision of high productive capacity as well as exacting dimensional accuracies and surface finishes.

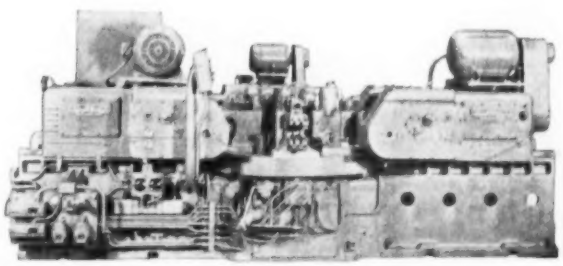
RESPONSIBILITY: Our Special Machinery Division is an integral part of the Kearney & Trecker Corporation . . . and is fully supported by all its financial, physical and personnel resources.

Any commitment for a product of this Division is a commitment that fully involves the accepted reputation for reaponsibility and satisfaction that is Kearney & Trecker's.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a four-station rotary indexing machine we designed and built for a major automotive manufacturer.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

U·S·S CARILLOY electric-furnace aircraft quality steel meets every requirement for these vital parts. The precision machining and expert heat treatment they get at Cleveland Pneumatic Tool Company complete the job.

NO ORDINARY STEEL could withstand the huge shock loads imposed on the main landing gears of Convair's giant Air Force B-36 Bomber. The plane has a maximum gross weight of 358,000 lbs., with still higher landing shock loads. But U·S·S CARILLOY steel has more than enough impact strength to hold up under this severe punishment.

Every B-36 lands on U·S·S Carilloy Steel

WHEN 179 tons of B-36 thump down on a landing strip, tremendous stresses are built up in the structural parts of the landing gear. Only the highest quality in steel can handle this tough job, which is one of the most exacting in the aircraft industry.

All of the rugged main columns for these landing gears are made from U·S·S CARILLOY electric-furnace aircraft quality ingots. This high quality alloy steel provides the great strength and shock resistance demanded in the performance of the finished part. The main columns for these landing gears are forged. The original ingot, as shipped to the forger, weighs approximately 37,500 lbs. From it are produced two columns, each weighing about 1200 lbs. In other words, approximately 93% of the steel has been removed—with a mere 7% of the original ingot left to do this tremendous job. Obviously, only steel of the very best quality can meet such exacting requirements.

The same care and skill go into every ton of CARILLOY steel that *you* buy, whether it's a giant alloy ingot or a few tons of special steel. Our experienced metallurgists keep a close check on *every* heat of steel to make sure it has the strength, hardness, toughness and machinability that's needed.

If you have a special steel problem, let us know. We'll be glad to help you with it.

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
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USS **Carilloy Steels**

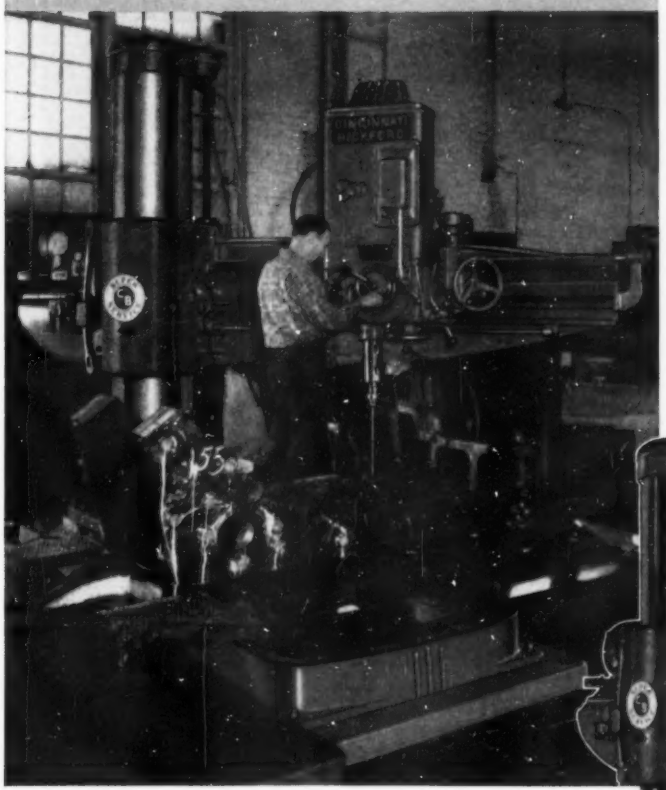
ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

3-1216

UNITED STATES STEEL

"top performers"

AETNA-STANDARD ENGINEERING CO.
ELLWOOD CITY, PA.

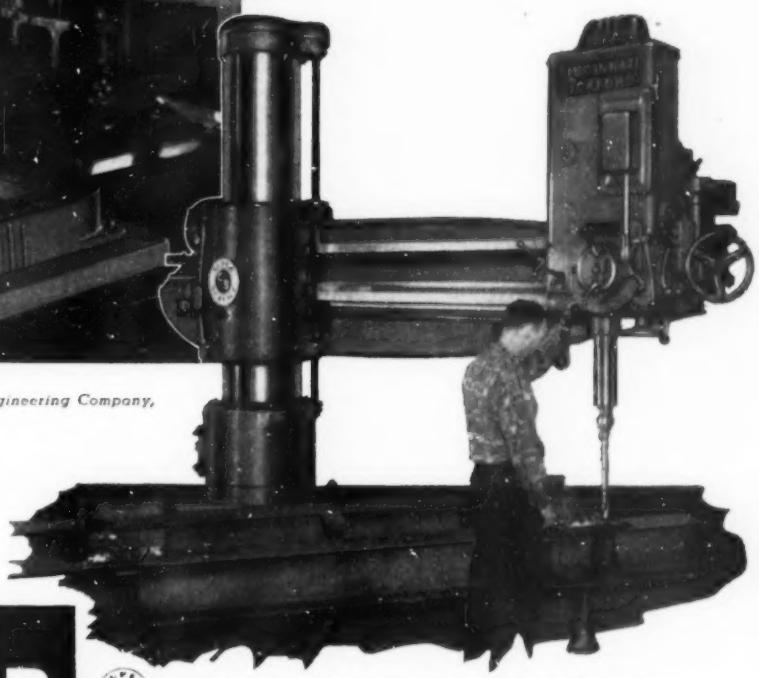


The Aetna - Standard Engineering Company say—"It is our opinion on radial drills that Cincinnati Bickford Super Service Radial Drills are top performers from the standpoint of service and handling ease".

Illustrations show the top carriage of gun carriage being drilled, tapped and reamed complete on this Cincinnati Bickford Super Service Radial—holes from ¼" to 1¼", limits within .0005".

Write for Booklet R-29.

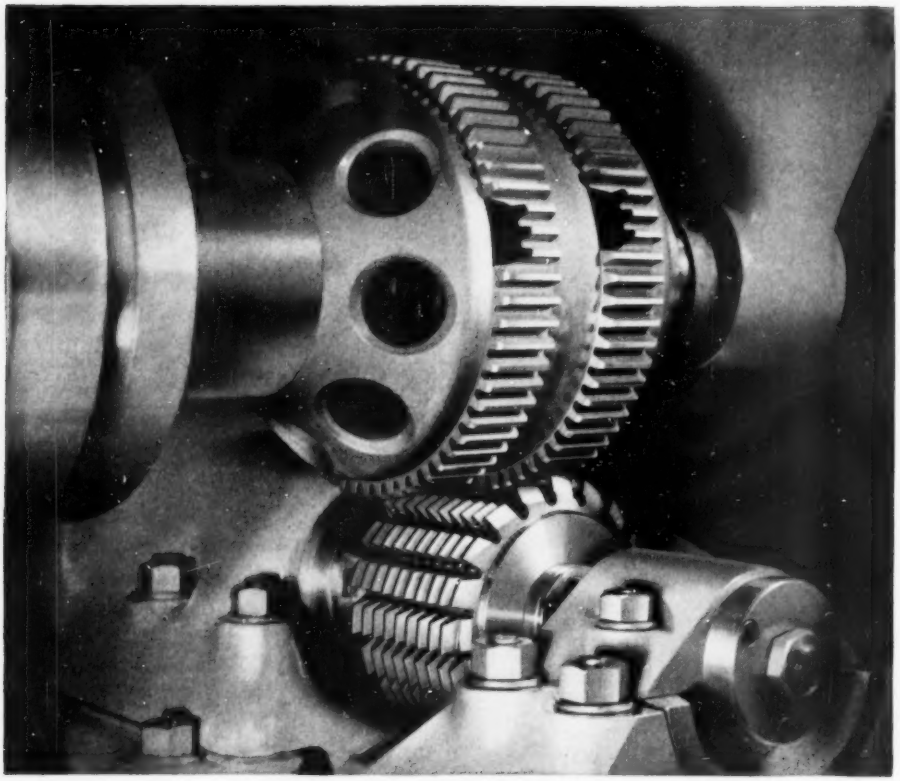
Photos courtesy of the Aetna-Standard Engineering Company, Ellwood City, Pa.



CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.



Hold .002" Over Pins, One-Cut Hobbing

ON NO. 14-15 MACHINE

Where heavy production and extreme accuracy are required, the No. 14-15 Hobbing Machine offers wide work range with extremely easy set-up and operation. Automatic cycling with infinite hydraulic feeds assures consistently high output.

On the job shown here, Caterpillar Tractor Co. is finish hobbing 8 pitch, 10" diameter clutch gears in 1-cut on a Barber-Colman No. 14-15 Hobbing Machine. Measurement over .250" pins is held consistently within .002."

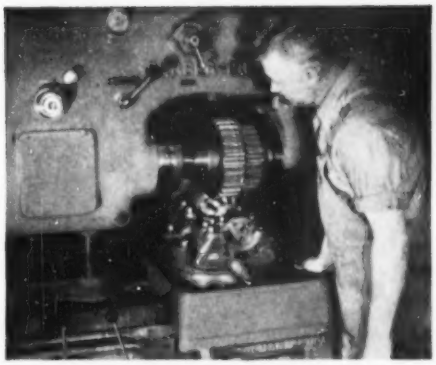
An important production feature of the machine is the built-in differential, standard equipment for convenience in hobbing helical gears. A large 18⅝" diameter worm gear running in anti-friction bearings also permits high speed precision indexing.

With capacity for one-cut hobbing of gears as coarse as 3½ pitch in steel, the No. 14-15 supplies rigidity and power to meet most any demands for high gear production and accuracy.

B U I L D E R S O F P R E C I S I O N G E A R

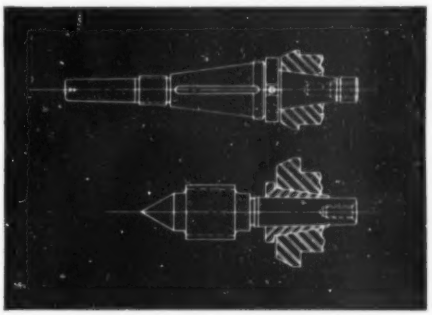
wide variety of work on no. 14-15 machines

In addition to these 8 pitch gears, a variety of high production gear jobs are handled on No. 14-15 machines in the manufacturing department at Caterpillar. The accuracy, versatility and production convenience of the machine make it ideal for heavy accurate gear cutting, typical of tractor production. Shown here is another job, a 3 pitch cluster gear with 10.333" outside diameter, hobbed in two cuts to pre-shave limits, one per load, holding .006" over .5760" pins.



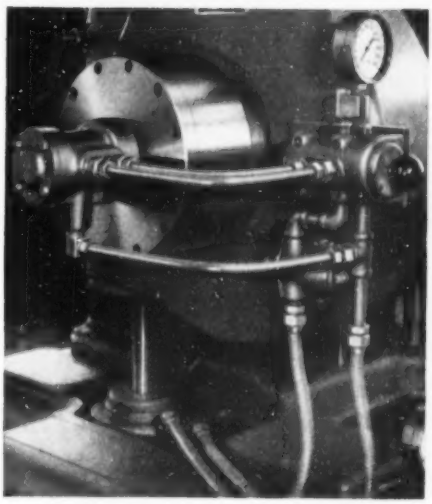
interchangeable hob spindle adds flexibility

The No. 14-15 has an interchangeable shank-type hob spindle as standard equipment. This enables the operator to interchange straight arbor, taper arbor or shank-type hobs to suit a variety of job conditions. Different diameter arbors may also be used. In cases where hob diameters are small and a shank hob is required, shanks may be inserted directly into the spindle.



hydraulic pressure available for tool clamping

Since the machine is an all-hydraulic machine, self-contained hydraulically actuated tooling for work holding is easily adapted. Hydraulically operated collets and chucks may be used as optional equipment when the machine is ordered with a hydraulic cylinder. Use of such equipment greatly reduces handling and loading time, and is particularly convenient where one operator is handling several machines. The hydraulic system of the machine has been constructed in such a way that this cylinder may be ordered and piped in after the machine has been in service.



Complete information on the No. 14-15 Hobbing Machine is available from your Barber-Colman representative; or send us part prints and production requirements, and we will gladly furnish estimates without obligation.

Write Us for a Copy of the New No. 14-15 Hobbing Machine Bulletin.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 6110 ROCK STREET, ROCKFORD, ILLINOIS

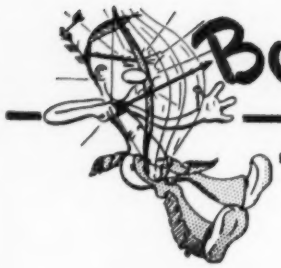
HOBS AND MACHINES SINCE 1911

L&I's broader range of high quality STANDARD reamers has met with overwhelming acceptance. Ask your distributor for latest information on L&I's quality plus . . .

L&I

The Reamer Specialists

LAVALLEE & IDE, INC.
CHICOPEE, MASS.



Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Golden Eggs

I was much interested in Mr. Rhodenbaugh's article, "Don't Chop Up Your Trainees." (*AM*—Aug 17 '53, p111). At the same time I was a little vexed at the reference to the ineffectiveness of public school training in machine shop work. In defense of the fine work being done by many machine shop instructors in our high schools—I have been associated with them for the past thirty-two years—I want to put in a substantial plug in their behalf.

If all the young men learn is how to read a micrometer and a scale, how to turn a shaft on a lathe, and how to drill a hole, then, for the sake of the poor sucked-dry taxpayers, let's eliminate the machine shop course from our curriculum. Fortunately, such is not the case, as I have observed for the past thirty-two years, and I want to go on record as one who is mighty proud of the educational achievements made by the many instructors upon whose shoulders lies the responsibility of putting over a sound course in the fundamentals of "metal-busting."

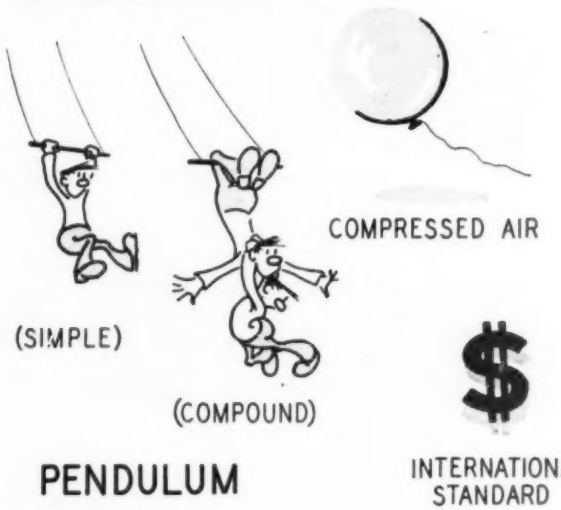
It must be borne in mind, however, that all pupils assigned to a machine shop course are not adaptable to such work but, unfortunately, have to stick with it throughout the year whether they learn anything or not. This is regrettable but, nevertheless, proper guidance consultation will remedy it in time. It must also be brought to light that there are many boys thrust upon the instructors, who have no intention of even trying to learn. They are not mentally equipped, so it is thought, to handle some of the academic courses and, as a consequence, they are dumped on the shop teacher to make it interesting for them so they will show up every day. All they are interested in is to see how much hell they can create and to do their damnedest to drive the public servant to a bughouse. It is probably this type that Mr. Rhodenbaugh has in mind.

The truth of the matter is that most of the shop students are worthy of all the effort put forth by the teacher but, on account of the few mental sluggards, who drag around with their pants full of lead, the effectiveness of the instruction is considerably hindered.

As a standard for a school shop I shall select the machine shop of the school in which I have devoted one-half of my life—the Chaffey Union High School, Ontario, California. The instructor of this shop has been in retirement for the past year, and I

GRINETICS

By D G SMITH



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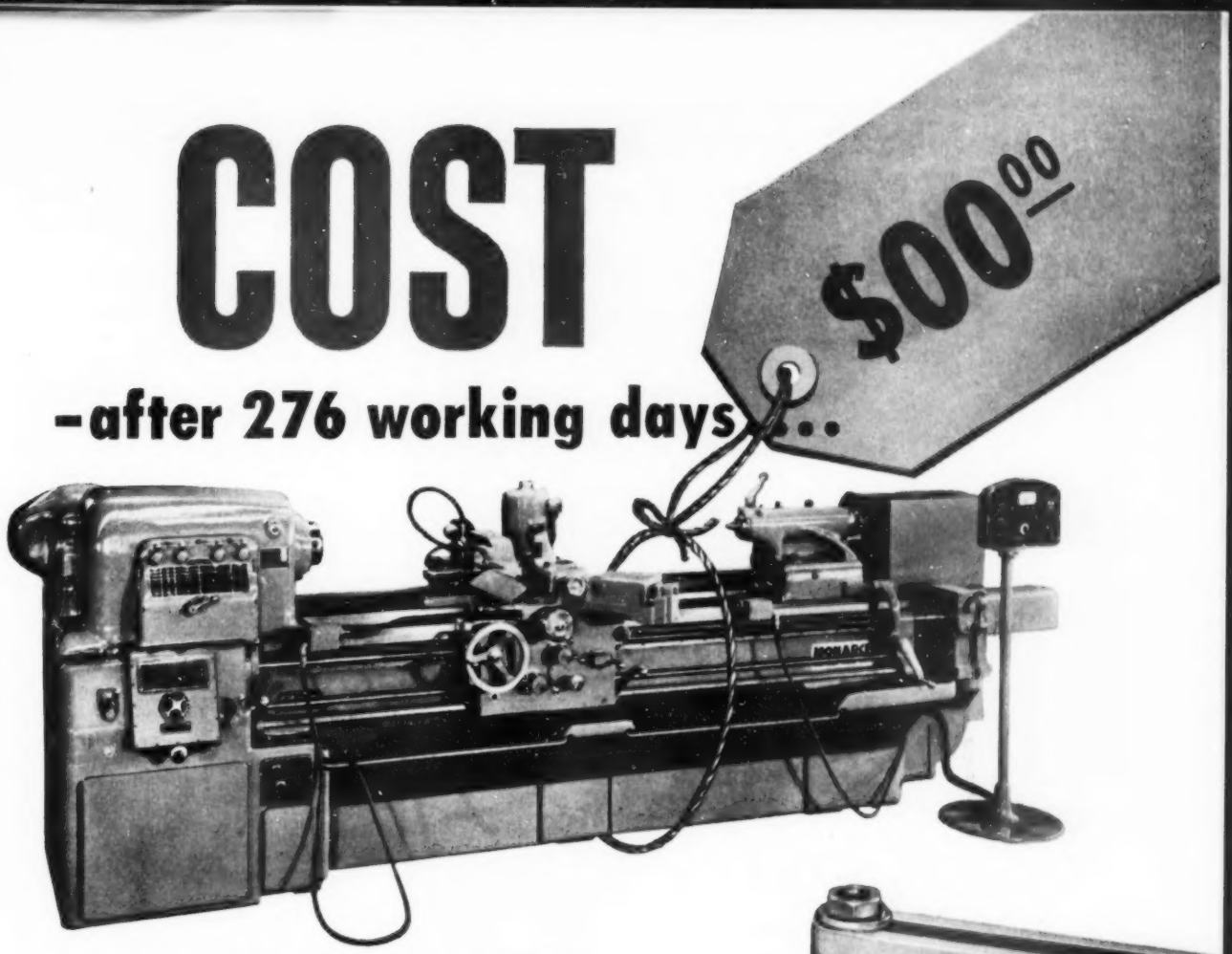
COST

–after 276 working days...



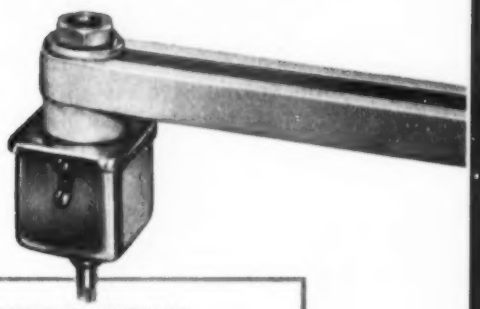
IT WROTE OFF ITS COST IN 10½ MONTHS!

This report comes from a well-known machine tool manufacturer (not us!). We can show you many similar ones from all kinds of plants. They all add up to one incontrovertible fact—Monarch Air-Gage Tracer controlled, fully automatic turning, with its single running tool, delivers output at top efficiency. Why not? Look how many ways it saves! In turning time. In setup time. In tooling time and costs. In subsequent grinding. It's true of short runs as well as long ones.

The Monarch Air-Gage Tracer is known everywhere for its superb accuracy of duplication. The swiveling type used here adds to this accuracy an amazing versatility. Apply it to our 20 x 72 Series 60 Lathe and add the Autocycle Control as above, and you have the shop man's dream come true—the ultimate in versatility *plus* fully automatic operation.

This manufacturer, after only brief experience with his Series 60, quickly added a 20 x 168 Model M Heavy Duty Lathe with similar equipment. Together, using round templates, these machines are delivering automatic output of over 600 jobs!

The Air-Gage Tracer is right! Its performance is right! Why don't *you* write—for complete information? Request Booklet #2606 and mention your specific requirements. . . . *The Monarch Machine Tool Company, Sidney, Ohio.*



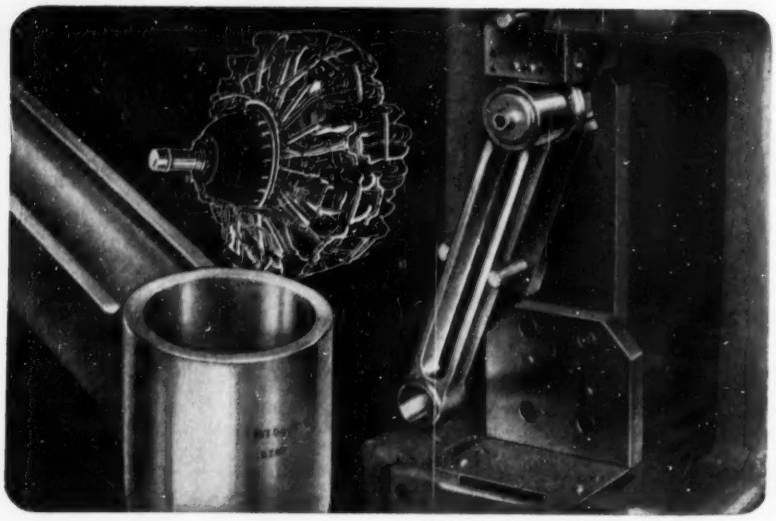
HERE'S HOW!

. . . And by the user's own figures! This lathe was bought to turn 20 to 25 jobs. It proved so versatile that, with the larger Model M, it's now turning 600. Time savings vary from job to job, but here's a sample. One difficult work piece used to require 3½ hours' turning. It's turned now—in lots of 24—in 10 min. per piece. Each *lot* in only slightly more time than it used to take for each *piece!*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

• • • • • FOR A GOOD TURN FASTER • • • • • • TURN TO MONARCH • • • • • •

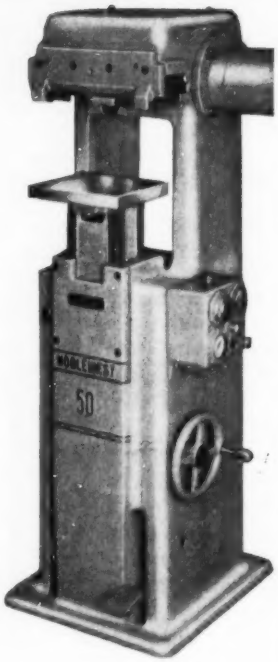
Leading Aircraft Engine Manufacturer
Saves 527 Hours Per Month
on a Single Marking Operation



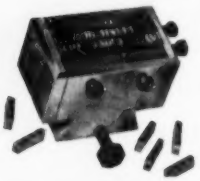
WITH THE

ROLL-O-MARK

all-pneumatic Model 50P1 illustrated here tooled for marking aircraft engine linkrods



The ROLL-O-MARK is the leader in the medium priced general purpose marking machine field. It utilizes the original NOBLEWEST *roll-marking* process which permanently rolls in inscription markings that last as long as the product itself. For the linkrod application illustrated above, tolerances on depth of mark were .0005 to .0015 —material tested 36 to 40 Rockwell "C". The ROLL-O-MARK is ideal for trade marking, part or patent numbering, codifying and serial numbering and will mark flat or round surfaces. For information on how Modern Marking Methods can cut costs in your plant, write The Noble & Westbrook Mfg. Co., 17 Westbrook St., East Hartford 8, Conn.



A MARK IS ONLY AS GOOD AS THE DIE THAT MADE IT

Noblewest marking dies and interchangeable steel type for use in NOBEWEST marking machines are made to exacting standards that result in clearer impressions and longer life. We also make the necessary die-holders and work-holding fixtures.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

EQUIPMENT FOR MARKING • GRADUATING • EMBOSSING • NUMBERING

can say without hesitation that he was one of the finest instructors with whom I have ever come in contact. If we multiply him by thousands, we can get a pretty good idea of the assistance Industry is getting from the forces of education throughout the land. I'm not writing this with the idea of getting a raise for it; I happen to be on the retired list, too, but I don't give up that easy; I'm in Industry again and as happy as a lark over the atmosphere created by red-blooded human beings.

In my visits around other schools in Southern California I have taken note of the equipment and course of study, and all I can say is that we should be very proud of our educational efforts along this line. It is in this course that the boy has a practical application for his mathematics —whereas in the regular math class he wasn't interested because he could see no direct bearing. The boy is subjected to a day of classroom lecture and periodic tests which keep him on his toes; the rest of the week he is exposed to the practical end—the running of the various machines in their order of difficulty. When he gets through his first year he has been exposed to the drillpress, lathe, shaper, miller, and grinder. If he applies himself with diligence he can gain as much good, or more, in a year's application, of the real fundamentals of the machinist trade as he could in a year of exposure in a real shop. Sufficient time is given so that he can be well informed on the idea of safety and, what is just as important, a pretty good groundwork in industrial relations.

With the proper textbook at hand, and an instructor who has served his time as machinist, there is no doubt in my mind that the youngster will be better prepared than if he were to spend an equal amount of time in industry, even though the experience may not be so varied. He acquires the necessary information to enable him to understand the basic fundamentals pertaining to each block of the machine shop course. I have seen my retired friend have a cluster of his boys about him while he lectured on the working features of the various machines—not only explaining the functions, but further enlightening them with the why. He commanded the highest respect from his boys and would tolerate no familiarity or discourtesy. He was trustful and reaped the concomitant reward of all the boys shooting square with him at all times. He used to be a railroad machinist, having served his time with the Southern Pacific. After the Smith-Hughes law went

into effect he qualified for his teaching credentials by going through the required hours at the university.

I want to say with emphasis, that the courses given in our high schools, in shop training, are something to be proud of and something that industry should be thankful for because of the preparation given the boys which materially relieves the employer in obtaining skilled help—potentially. He was vigilant in spotting boys of special talent and would take them into his office and urge them to get in somewhere to serve their apprenticeship. Many of his boys are now owners of their own shops, and there are untold hundreds who have developed into good citizens with a trade enabling them to support their families in the American way. The only regret I have is that Industry does not show enough interest in supporting educational efforts put forth in their own behalf. So in closing I urge Industry to keep the goose alive by showing an active interest in problems of education.

John Homewood
Tujunga, Calif.

No Arms, No Armor

It is nearly 2500 years since Socrates was condemned to death by the hemlock cup for the grevious sin of teaching the young to think. We are much more civilized today—we merely throw the teacher out of his job and let him starve to death.

I am not an advocate of Communism—I hate it. But how are our young people to fight this monster if they are not permitted to know anything about it? We tell our youngsters, "Communism is evil—fight it," but we give them no weapons and no shield.

Teachers at all educational levels are being dismissed because they tried to teach their students something about Communism. This is wrong. Give the student some knowledge of what it is and what it stands for, and he will have a fair chance to beat it. Keep him in ignorance and he will fail. Worse, he will be in grave danger of being poisoned by its insidious doctrine.

Serge Orloff
New York City

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Universal Tool and Cutter Grinders

Universally Acclaimed for ——

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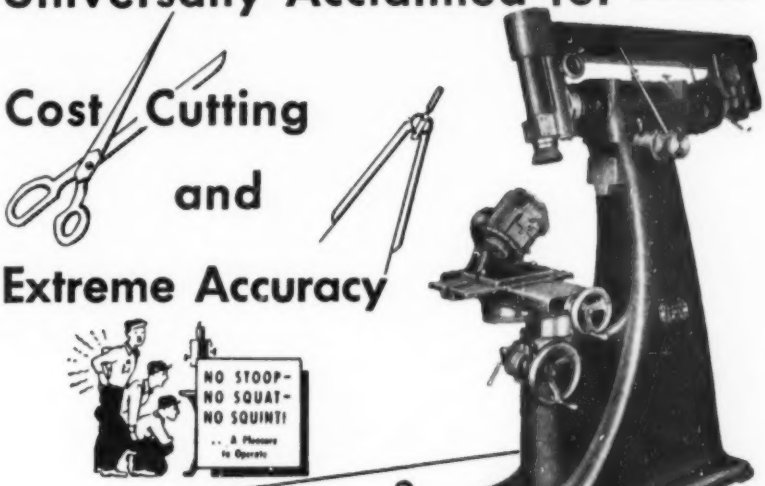

Oliver Ace Tool and Cutter Grinders make difficult jobs easy and economical . . . keep the most difficult cutters sharp. Check these Oliver Ace-High points of superiority:

✓ 1. Direct reading for clearance reduces operator's fatigue . . . No Stoop, No Squat, No Squint. Requires no computation.
✓ 2. Assures highest degree of accuracy
✓ 3. Built to give long-lasting service.
✓ 4. Handles wide range of cutter grinding.
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Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing and carbide tipped circular saws.

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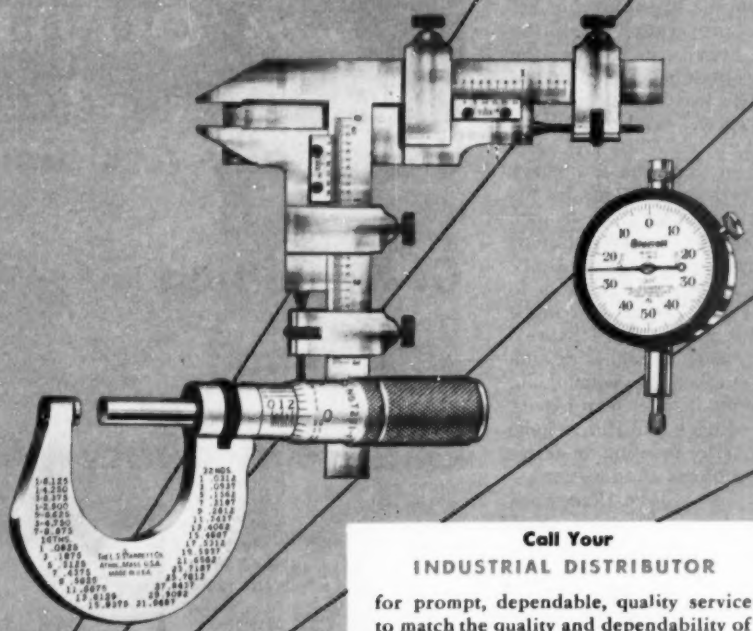

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can you think of a better name
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For more than 70 years, American industry has staked its reputation for quality on Starrett precision tools. No name is better known, none stands more completely for unqualified *dependability*.

Keep the name *Starrett* in mind when you buy dial indicators, steel tapes, hacksaws, band saws, band knives and precision ground die and flat stock. When you specify *Starrett* you know you are getting precision-made products that have always been standard for quality, precision and, above all, complete dependability.

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MECHANIC'S HAND MEASURING TOOLS
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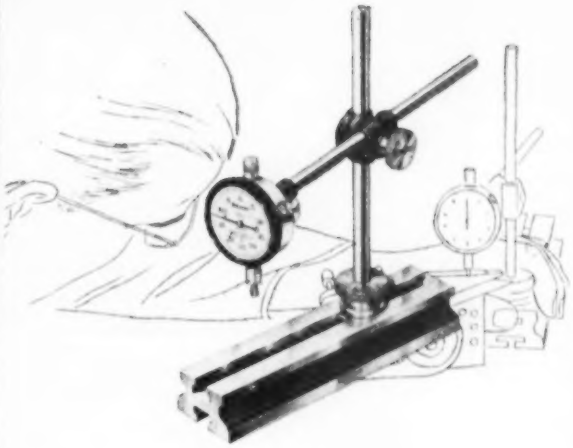

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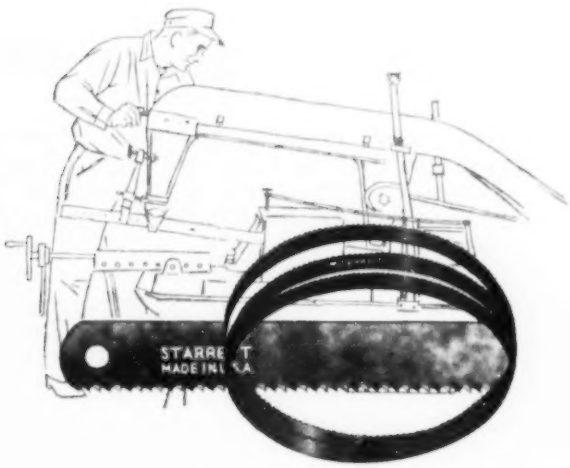
Made to meet the highest standards of precision performance for every quality control need.



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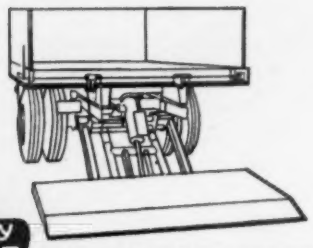
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY
ATHOL, MASSACHUSETTS, U.S.A.

Checking the dies in a DANLY SPECIAL DIE SET—all steel, 4-post type, 26" x 35".



ANTHONY LIFT GATE HYDRAULIC

SHOWN IN LOADING POSITION

DANLY SPECIAL DIE SETS

View showing DANLY SPECIAL DIE SET during production run. Tail gate gussets are blanked and pierced in a single stage operation from .10 gage blue annealed sheet.

DANLY®

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS SUPPLIES

help Anthony give industry a lift!

For years now, the Anthony Company, makers of hydraulic lift gates for motor trucks, has relied on Danly Special Die Sets in their production operation. Based on long experience, they've found that Danly Special Die Sets cut their tooling costs and save time . . . because they provide the finest precision starting point for diemaking. Why not build your production dies in Danly Special Die Sets? . . . see what die performance can really mean.

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2100 South Laramie Avenue, Chicago 50, Illinois

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*Indicates complete stock

SPOT NEWS of Metalworking

- **Hand-held template-corner cutting machine has saved $6500 a year** at Boeing. Unit is not much larger than a rivet gun, shears even 0.090-in. annealed stainless at 7020-lb shearing load, twice as fast as hand-operated arbor press.

- **A research institute for machine tools** has been established at the University of Copenhagen (Denmark). Its purpose: to improve machine tools, increase their applications.

- **All regulations are off on usage of diamond grinding wheels** as a result of many requests to NPA's Metalworking Division by users, who have assured NPA they will still give preference to military and atomic energy applications.

Final decision on the Air Force Heavy Press Program: it's still cut from 17 to 10 presses. But because of the Air Force's "no space, no tool" policy announced in July, Reynolds Metals Co has backed out, refusing to house a 12,000-ton extrusion press and an 8000-ton press at its own expense at its Phoenix, Ariz, plant. Air Force will now install the larger press at Harvey Machine Co, Torrance, Calif; the smaller at Kaiser's Halethorpe, Md, plant.

- **Gear-cutting machine that cuts 16 small gears at a time,** can cut a 40-in. gear on one side, a 30-in. gear on the other, has been developed in South Africa. Pinions up to 5-in. diameter can be placed in banks of four around cutter, quadrupling its output.

- **Government is allowing 100% writeoff for industrial atomic bomb shelters** on a 5-year certificate of necessity. First US industry to participate in the program is Cincinnati Milling Machine Co — building two underground shelters at a cost of $500,000. Similar industrial civil defense projects rating 100% writeoffs will shortly be announced by the government.

- **Supporting bearings on an anodized aluminum surface eliminates fretting,** increases bearing life, a West Coast metalworking firm reports.

- **Russian industry is seriously handicapped by lack of machine tools** such as turret lathes, milling machines, grinders, and especially automatic polishing tables, reports **Izvestia** — this despite the vastly improved array of Soviet machine tools displayed at Leipzig Fair.

Industry has really been fire-conscious since the GM disaster. Here's how Ford plans to avoid a similar fiasco: putting up two small buildings with all modern types of roofing, setting fire to each type and (1) watching how fast it spreads, (2) how quickly it can be extinguished, or (3) if the roofing material will light at all. Other precautions planned: bare concrete floors, more fire curtains, better housekeeping, huge water tanks at plant sites, fire-control classes.

- **Nationalization of Britain's engineering industries** was voted down decisively at the British Labor Party's annual convention. Proposal was to nationalize manufacture of armaments, aircraft, agricultural machinery, machine-tools, motor vehicles, ships, radios, railway equipment and textile machinery.

- **Rules under which small craft unions can be carved from a plantwide union,** creating many unions for management to deal with instead of one, are being reconsidered by National Labor Relations Board. Small companies fear (1) interplant union rivalries, (2) less freedom to switch workers from job to job.

- **Blind men are being taught to operate turret lathes** and other complex power-driven machines successfully at New Hampshire Technical Institute — a new source of skilled manpower for the metalworking and electronics industries.

New!

VERTICAL PRECISION BORING MACHINE

BY

EX-CELL-O

The new Ex-Cell-O Style 425-A Vertical Precision Boring Machine

A Flexible, Automatic Machine for Precision Boring, Turning, Facing

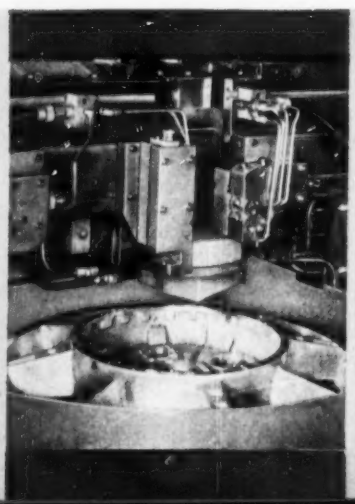
Developed by Ex-Cell-O, this standard Style 425-A Vertical Precision Boring Machine is massive and versatile. It has a heavy-duty, high-speed work spindle and rigid tool slides for close-tolerance work with a fine surface finish. It's designed for accurate production work on large parts.

The heavy cast base supports a column on which two vertical slides are mounted, each carrying a cross slide. Slides are operated by large hydraulic cylinders and move on hardened and ground steel ways. Vertical slides are fully counterweighted. All these features mean smoother operation.

The large work spindle supports a 36-inch diameter table having T-slots for mounting fixtures. The table is driven through a precision worm at variable speeds up to 500 rpm.

The machining cycle is completely automatic, including movements of vertical and cross slides, changes in work speeds, flow of coolant, and lubrication.

For more information and complete specifications on this new machine call in your Ex-Cell-O representative or contact Ex-Cell-O in Detroit today.



Close-up view of a Style 425-A equipped for operations on a jet compressor frame. Tools in the left slide face 2 surfaces, turn one diameter and chamfer one edge. The right-hand slide carries tools for feed-facing, precision boring and chamfering.

12 Features OF EX-CELL-O'S NEW MACHINE:

- Massive, Rigid Construction
- Easy Loading and Unloading
- Variable Speeds to 500 RPM
- Counterweighted Slides
- Large Hydraulic Cylinders
- Hardened and Ground Ways
- Flexible Automatic Cycles
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- Conforms to J.I.C. Standards
- Skilled Operator Unnecessary

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

53-38

Washington

Washington is talking more money for air power. First hint of a boost in Air Force funds for fiscal 1955 was President Eisenhower's recent "no-tax-too-great-to-meet-the-enemy" observation in Boston. But this was no more than a hint of what the White House will do, for Budget Director Dodge still aims to keep fiscal 1955 defense funds at least $5 billion below this year's $34.5 billion.

So another fight for Air Force money is shaping up. First showdown is now getting underway before National Security Council. Pentagon plans to work out details for next year's total budget by the middle of the month. This would be a rough estimation only.

• • •

US will probably put up about $200 million this year for off-shore procurement of European planes for NATO defense. At least that's what the Air Force is recommending. It's about 35% less than last year, when the off-shore program totalled $583 million, with the US putting up $320 million.

Fiscal 1954's off-shore procurement program should be announced later this month or next. It's a good bet that the US will be financing purchases of the same types of planes as last year — Hawker Hunters, Vickers Swifts, French Mysteres, and F-86D production in Italy. British Sea Hawks, however, may be dropped.

• • •

Money figures indicate that aircraft production is lagging this year. USAF started off fiscal '54 with $2.7 billion in unobligated aircraft procurement funds, Navy with $422 million. But new plane ordering during July only nibbled at this. USAF obligated only $149 million, Navy only $23 million.

With $4.9 billion in new money for fiscal '54, USAF and Navy had a total $7.8 billion on hand for new plane orders Aug 1. This means an average obligating rate of about $700 million monthly for the rest of the year—if the money is to be obligated. But spending, which indicates delivery rates, is lagging. During July, it totalled $587 million for both services. Estimate of the Wilson program, submitted to Congress three months ago, was $717 million. Total unspent USAF and Navy funds for aircraft and related procurement are now $26 billion.

• • •

Mining men are peeved that the stockpile has virtually withdrawn from the metals market. ODM has announced a slowdown on the program, limiting new purchase commitments to only about 10 of the most critical materials that are stockpiled. Practically all are foreign goods.

Domestic metal producers complain that when metals were tight, the stockpile entered the market—creating shortages, boosting prices sky high, and bringing back controls. Now when the industry can use a shot in the arm, the stockpile withdraws from an already declining market.

The stockpile is in good shape. Roughly 80% of total objectives—covering 75 materials—are either on hand or under contract for future delivery. On individual goals, 35 have been met, 15 are 80% or more achieved, and 25 are less than 80% complete. But many experts think the goals are too low and should be substantially increased. For the most part, the goals were set up in 1946 and have not been seriously revised to date. The critics say the international situation has changed so much since then that stockpile planning is obsolete and should be radically altered.

• • •

Hottest tariff test case comes up next month when the Tariff Commission starts hearings on domestic lead and zinc producers' application for escape-clause relief. Producers seek more than 50% hike in import duties and quotas on imports. Observers think the miners' prospects for tariff relief look stronger than ever.

Meanwhile, free trade circles in Washington are no longer as optimistic about what the President's Foreign Trade Policy (Randall) Commission will recommend as they once were. They now fear the commission's report will be innocuous.

• • •

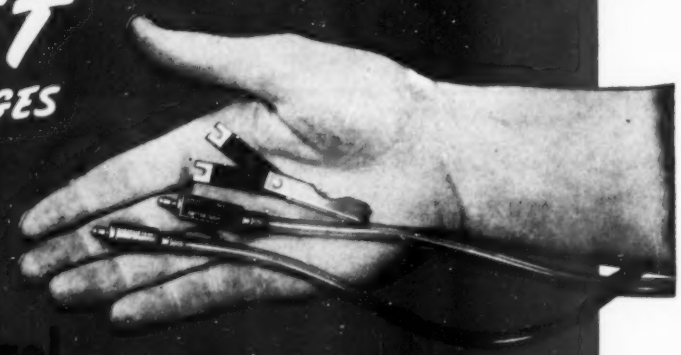
As anticipated, SBA Administrator Mitchell has set up a tight lending policy dictated in part by other members of his Loan Policy Board, Commerce Secretary Weeks and Treasury Secretary Humphrey. Lending will be restricted during the next year, at least, to small companies in "defense or essential civilian production." There'll be a flexible rate of interest, averaging 6%.

Congress won't get Eisenhower's views on Taft-Hartley until it reconvenes next January. Meanwhile, both labor and management will step up efforts to get amendments favorable to their viewpoint.

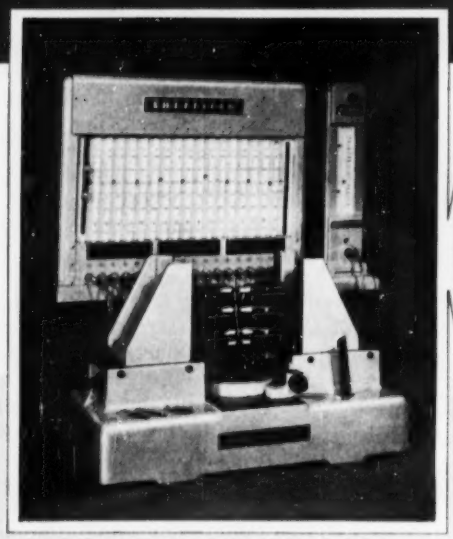
Eisenhower will ask for less than the 19 amendments Durkin claims the President promised. This will not satisfy labor leaders. They want even more.

Even so, business men supporting Taft-Hartley worry that Eisenhower will lean too far in labor's favor. They will rely on cabinet members like Weeks, Humphrey and Wilson to keep the administration's labor policy from undermining Taft-Hartley.

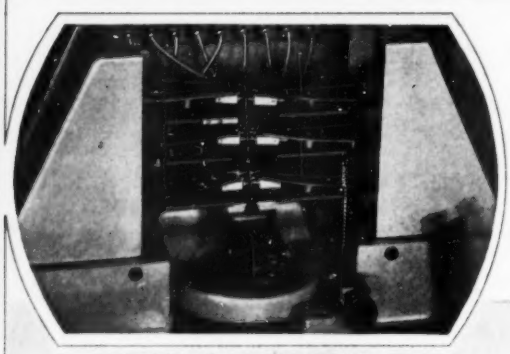
PLUNJET
GAGING CARTRIDGES



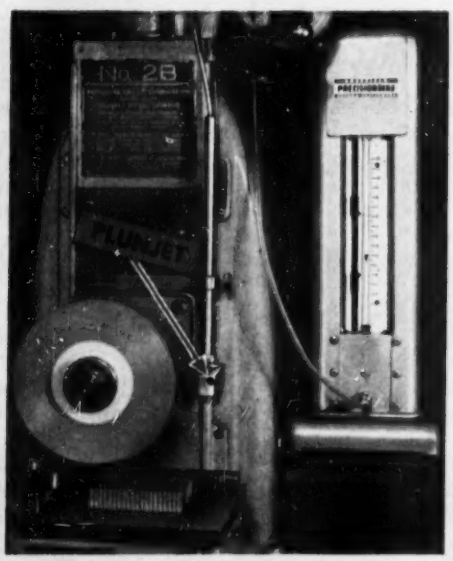
WIDELY USED
For Inspection
and Machine Control



Plunjets with Precisionaire for checking jet engine blades.



Jet blade fixture using Plunjets.



Plunjet feed gage enables operator to grind to a degree of accuracy previously impossible.

PLUNJET GAGING CARTRIDGES ... the self-contained gaging heads you can use practically everywhere, were developed by Sheffield in 1949.

THOUSANDS ARE NOW IN USE on a wide variety of gaging fixtures and machine control applications.

MORE THAN FIVE THOUSAND are used on gages for checking jet engine blades.

PLUNJET GAGING CARTRIDGES ARE STANDARD LOW-COST STOCK ITEMS which can be applied by users to practically any gaging fixture or machine tool control where indication is required.

WRITE FOR ENGINEERING DATA giving ranges, amplifications, applications, mounting dimensions and prices.

IMMEDIATE DELIVERY FROM STOCK

6302

SHEFFIELD HEADQUARTERS

the **Sheffield** corporation

DAYTON 1, OHIO, U.S.A.

Detroit

If you want to avoid $3490 worth of temptation, don't take a demonstration ride in Chevrolet's Corvette.

The plastic-bodied speedster offers what is easily one of the most delightful rides of any car available. Without sacrificing a smooth ride, Chevrolet engineers have built excellent performance characteristics into the 33-in. high car, which is capable of turning up 130 mph or more — a fact being played down by salesmen.

But one fact they are quite happy to play up is that models are now so scarce that they are being delivered only to "prestige" customers—bankers, publishers, major company presidents.

The cars are being turned out at a three-a-day rate at temporary facilities in Flint. In early 1954, manufacturing will be done solely in Chevvy's St. Louis assembly plant. Schedules call for production of 1000 Corvettes a month in 1954.

Through this year, the company will have built only 250 — a niggardly figure when compared with regular Chevrolet car and truck output of 250 units every half-hour.

E N Cole, chief engineer, noted that had Chevrolet gone to steel bodies, tooling costs would have been about $4.5 million. By using reinforced plastic, the cost was less than $500,000.

The point of diminishing returns is reckoned at 15,000 units annually. That is, after that production point, steel would become cheaper.

• • •

Auto and truck output dipped slightly toward the end of September, but the third quarter was still headed toward a volume approaching 1.6-million units, easily making it the second highest third quarter in history.

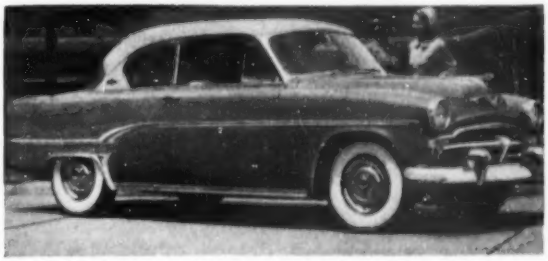
Performance was all the more remarkable in view of cutbacks at Chrysler due to model changeovers, cutbacks in three GM divisions and zero output at Lincoln because of lack of Hydra-Matics, and generally reduced schedules among independents.

Output was held at high levels mainly by prodigious efforts at Ford, which for three weeks running slated production of more cars than Chevvy. Among the many production records Ford has broken was a five-day output of 34,490 cars and trucks, 215 more than were produced in its previous five-day record period.

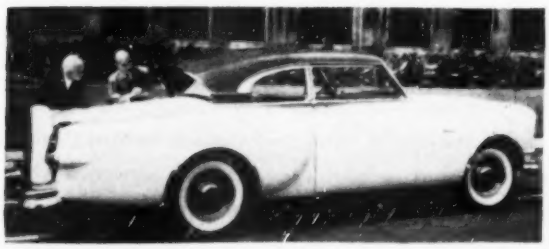
• • •

PowerFlite, automatic transmissions, available on Chryslers since last summer and being offered on 1954 Dodges, are being built at the rate of 700 per day.

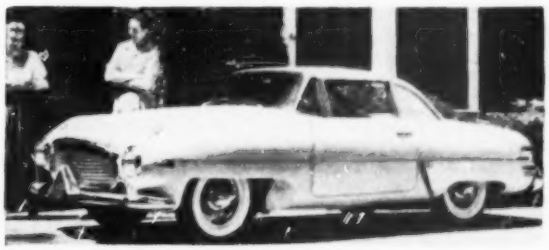
Unlike most automatic transmissions, the Chrysler product employs no parking position on the selector lever, thereby eliminating chances of its jamming or self-disengaging. Instead of a parking position, Chrysler depends on a internal-expanding hand brake. The brake is capable of holding a car parked under any circumstances, says Chrysler.



DODGE'S NEW ROYAL V-8 HARDTOP celebrates Dodge's 40th anniversary. Mechanical features: 150-hp Red Ram V-8 engine, PowerFlite fully-automatic transmission (100 lb lighter and containing 110 fewer parts than complex competitive units), full-time power steering. Design features: spear-shaped molding along sides; lower, cleaner grille; recessed headlights; leather-like glare-proof instrument panel



PACKARD BALBOA, an experimental hardtop sedan, features a canopy formed by the "trailing edge" of the roof. The rear window is vertical and flat, eliminating distortion common in today's wrap-around windows. Canopy keeps wind and rain off rear window for greater visibility, and shades rear-seat passengers, who sit far back because the Balboa lacks the conventional rear-window ledge. Should the Balboa go into production, design would permit lowering of rear window

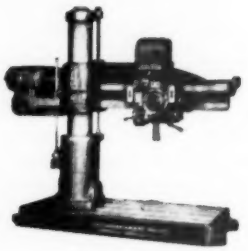


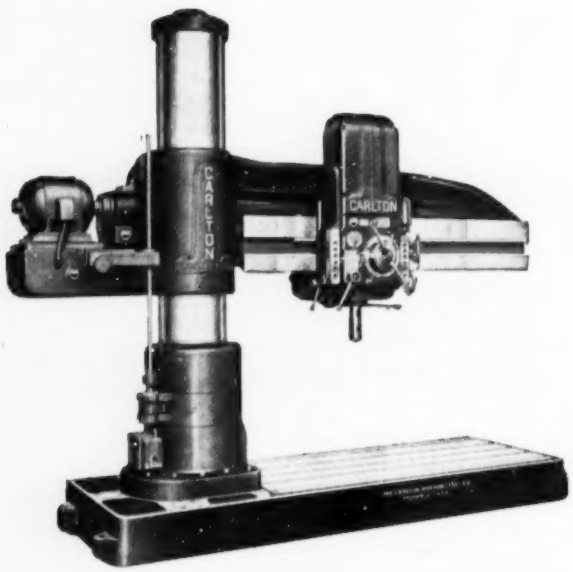
HUDSON'S ITALIA, prototype model developed in conjunction with Carrozeria Touring of Milan, Italy, is probably the only one of its kind Hudson will produce, but its styling foretells future Hudson standard model design. Italia has 105-in. wheelbase, is powered by 114-hp Hudson Jet engine. Features: airscoops over headlights to cool front brakes; three chrome tubes faired into each rear fender to house tail lights, signal lights, back-up lights. Seats are adjustable, safety-belt equipped

there's a

Carlton *for all your radial drill requirements*

1A---- 9″ col. 3′-4′ arms
11″ col. 3′-4′-5′ arms





3A---- 13″ col. 4′-5′ arms
15″ col. 4′-5′-6′ arms
17″ col. 5′-6′-7′ arms

4A---- 19″ col. 6′-7′-8′ arms

5A---- 22″ col. 7′ to 10′ arms
26″ col. 8′ to 12′ arms

Only "One" can be called "the finest"

Carlton's centralized pushbutton control, low-hung drive, 3-unit power clamping, all ball bearing construction, modern lubrication and Carlton's many other advantages assure maximum hole production for you. For prompt information on the Carlton Radial Drill you need, use coupon.

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☐ 1A ☐ 3A
☐ 4A ☐ 5A

Name.....

Company.....

Address.....

City.....Zone.....State.....

Machine Tools

Machine tool sales are holding up very well. But admittedly the situation is not uniformly good with all companies.

Production still is high by whatever standards you may apply. It will continue high the remainder of the year.

• • •

Shipments are likely to shrink thereafter. That does not mean, however, that the decline in operations in builders' plants will be as great as the drop in dollar volume indicates.

At least some of the shrinkage will come from the dropping off of subcontractors. A number of subcontractors will clean up their commitments by December and their machine tool building then will cease.

• • •

Inquiries have been heavy, many builders report. A few companies, on the other hand, complain that the amount of pending business has dropped sharply.

A large number of builders have hefty second shifts at work. By contrast, several companies are down to a single-shift basis, with that shift working overtime.

• • •

Whatever machine tools are to be sold the next six months will go largely to customers working on civilian products. The amount of buying for defense purposes with government money will be relatively small, unless some unexpected emergency arises.

Potential machine tool business is large. Many orders have been placed by the automobile industry for delivery late in 1954 and even into 1955.

• • •

Ford has been making sizable purchases for its new engine plant at Cleveland. It still is to buy much new equipment for that project.

Chrysler has an important tooling program for its Canadian subsidiary.

Backlogs of some makers of special-purpose machine tools are actually getting bigger.

• • •

A reasonably satisfactory solution has been arrived at for the problem of leasing or renting surplus machine tools owned by government agencies.

The Department of Defense apparently has agreed to lease its machines only for defense or defense-supporting work, except in special instances.

Wholesale leasing of machines for non-defense production is to be banned.

• • •

The exceptions to this broad rule are to be these: (1) Companies confronted by a critical emergency, such as General Motors with relation to the Livonia fire, may rent surplus tools until they can get machines on the commercial market; and (2) very large machine tools, that are costly to move about, are to be left where they are, and the companies now in physical possession of them may use them on regular work.

Office of Defense Mobilization will have the final word on approving use of machines for non-defense purposes.

Some critics point out that this means little, because ODM seems to be swayed these days by whatever policies Secretaries Wilson and Kyes lay down at The Pentagon.

• • •

Gear hobbing machines, milling machines, automatic screw machines and internal grinders are said to have been among the types of machines sought.

The urgency of the mission was so great that the tools purchased were to be sent to this country by air freight.

The engineers looked over a supply of U.S. machine tools in England that have not yet been allocated to a specific defense project.

• • •

Some 400 US security-aid machine tools are still in storage in Britain. If General Motors picked any of them, the money paid for them was to be turned back to the US government by the British.

Chief engineer of the Livonia plant is reported to have been head of the group that selected 20 suitable British machines and then considered taking 20 others.

• • •

After the engineers were well along on their buying mission, they received instructions from Detroit to cut drastically the list of tools to be bought.

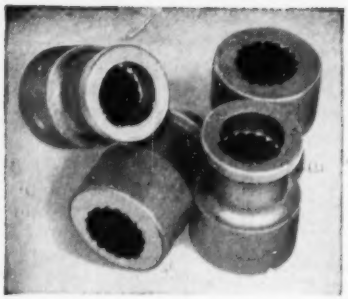
Reasons for this decision were that: (1) Rehabilitation of the machines from Livonia was proceeding better than anticipated; and (2) more new machines for replacement of the gutted tools were available in the United States than General Motors had previously thought.

• • •

The upshot is that a new Bullard is likely to be the only machine bought from Britain's unallocated supply of US machines. In addition, three tools are being taken from the United Kingdom strategic stockpile.

Some drilling machines also are said to have been bought from a British builder. A small quantity of US machines will be acquired from Germany.

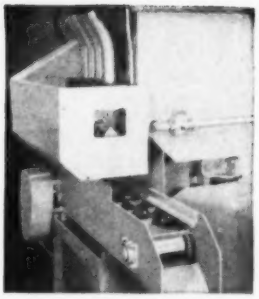
BF



13,600 Splines/hour on one machine

The part: Steel forgings in which 17 internal splines of 1½" O.D. are to be broached.

The machine: A Colonial 20-ton 48" stroke Pull-up with multiple loading chutes, positioning shuttle and automatic ejector conveyor.

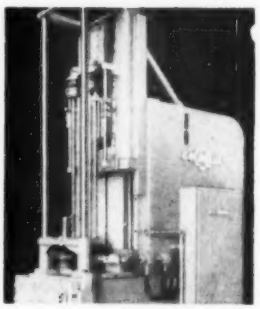


Colonials help you do MORE JOBS on FEWER MACHINES

12 Surfaces, 8 Bores on two machines

The part: Tank track forging requiring finishing of 6 flat surfaces and 4 bores in thin webs, broached two at a time.

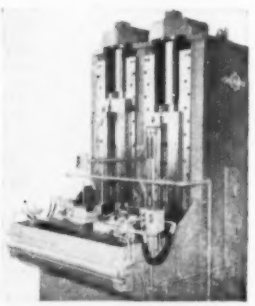
The machines: Colonial 25-ton Dual Ram for flat surfaces, Colonial Pull-down with automatic spreaders to support the part while broaching bores.

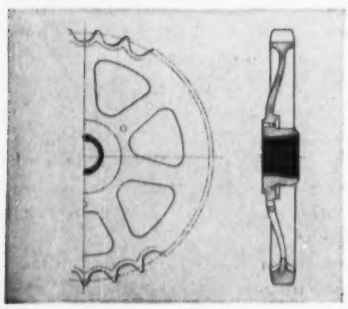


7 Surfaces, 4 Operations on two machines

The part: Tank track center guide to be completely machined as shown.

The machines: Two 25-ton Dual Ram machines perform all operations, produce one guide for each machine cycle.

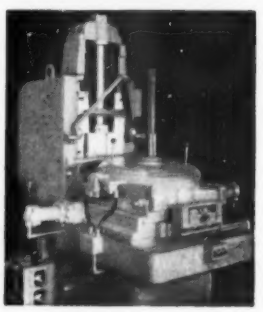




Large Tapered Splines Broached in One Setup

The parts: Tractor wheel hubs, (several sizes).

The machine: Colonial 15-ton Pull-down equipped with special angular short-shuttle table, and automatic index.



PIONEERS OF H.S.S. BROACHING

BROACH CO. DETROIT 13

For further information on the examples shown here, ask for Broaching News, Volume XIV, No. 3

SURFACE BROACHING IS BOOMING

Figures recently released by the Department of Commerce show that there were a total of 637 Surface Broaching Machines shipped by American manufacturers in 1952 as against only 245 in 1951. This tremendous upsurge in surface broaching is a clear indication of its tremendous importance in the high productive capacity of American manufacturers.

Back of this upsurge in surface broaching stand years of development and improvement in broaching machines, broaches, fixtures, and automatic handling of broached parts.

Colonial Broach Company has had an important part in this development and constant improvement for the last thirty-five years. Examples of this development are: High Speed Steel Broaches for increased life and accuracy, Carbide Inserts for high speed surface broaching, Hydraulic Broaching Machines, Automatic Broach and Automatic Parts Handling, Automatic Shuttling Fixtures, Hydraulic-Electric Controls and Automatic Broaching Cycles.

One of the most important contributions of Colonial Broach is "Unified Broaching." With single responsibility for design, manufacture and installation of complete Broaching Equipment, it brings to the production manufacturer an all-over consideration of his problems. This "Unified Broaching" includes Broaching Machines, Broaches, Fixtures, and Automation, all by Colonial Broach Company. Automatic gaging may also be included.

By working out a unified team of broaches, machines, fixtures and automation — properly installed in relation to their use—lost time and inefficiency are reduced. The parts are quickly handled, accurately machined and properly finished with fewer operations in a smaller area of your shop. Production zooms upward when responsibility is centralized in hands that have experience, imagination and competence in complete Broaching Installations.

"Unified Broaching" is being applied to both external and internal applications for broaching materials of all types, sizes and contours. Harmonious design of all the component parts of a complete Colonial "Unified Broaching" Installation starts with part print, material specifications, and production requirements of the part desired. Send this information on your jobs to Colonial Broach Company, Detroit, and request a quotation on a "Unified Broaching" Installation for your plant.

Read "Broaching News" for latest developments in broaching. We will be glad to see you get it regularly if you will drop us a line on your company letterhead.

"A BUSHING IS a Bushing"

"After all, a bushing is a bushing." To Colonial Bushings, Fraser, Michigan, that oft-repeated phrase is an invitation to explain why a Colonial drill jig bushing is a thing apart from "run of the mine" bushings.

Qualities like a steel that gives consistently long life in bushing service, I.D. concentric with O.D. within 0.0003", fine finish, dependable accuracy on all dimensions, shipment from stock, are some of the points mentioned. If the bin runs dry because of excessive demand for a particular standard size, the shop is set up to replenish this size in short order. Parcel Post hastens delivery of the bushings to the user. And all through the organization, there is a genuine willingness to serve the customer.

Through these qualities and practices, the demand for standard Colonial Drill Jig Bushings is constantly expanding.

Specials

The quality of these standard bushings in service plus the willingness of Colonial Bushings to serve the customer has been responsible for the increasing growth of another service to Colonial's customers—the production of special bushings.

Special bushings are made to the customer's print and specifications. These specials are quite often intricate, at other times only slightly different from the standard drill jig bushings. The flexibility of Colonial's shop enables the production of these specials promptly and to the desired accuracies and specifications.

So whether the customer requires standard drill jig bushings that are a shade better, or specials to answer the needs for a particular problem, they are both available from Colonial Bushings, Inc., 31780 Groesbeck Highway, Fraser, Michigan. Ask for "Flip-A-Page" Catalog B-649 for Colonial Standard Drill Jig Bushings, or send prints for quotes on Colonial Specials.

ANCHOR COUPLING COMPANY plant, Libertyville, Ill. These Greenlee Automatic Screw Machines are top performers with *Texaco Cleartex Oil* as both coolant and machine lubricant. In hydraulic bending and testing machines, *Texaco Regal Oil (R & O)* assures freedom from rust, sludge and foam. The entire plant has been Texaco-lubricated for over ten years.

ANCHOR COUPLING COMPANY specializes in the manufacture of hydraulic hose with special couplings. Steel, brass and aluminum are machined on various machines, including a battery of 13 Greenlee automatics. Texaco Cutting Coolants and Hydraulic Oils have been used exclusively for over ten years, with outstanding results:

"We get top-speed production with Texaco, and the finish of parts coming through is excellent. Tool life has been exceptional. In addition, the help rendered by Texaco Lubrication Engineering Service has been an invaluable asset to us."

And so it is in every type of plant, wherever located. *Texaco Cutting, Grinding and Soluble Oils* and other Texaco Industrial Lubricants—used in conjunction with Texaco Lubrication Engineering Service—are helping manufacturers produce more at a lower unit cost.

Let a Texaco Lubrication Engineer help you gain these important benefits. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

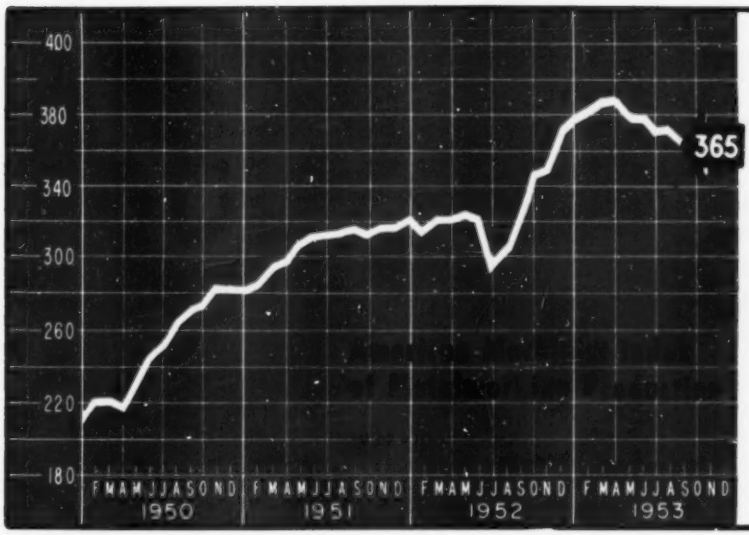
☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	SEPT '53(*)	AUG '53(p)	JULY '53(r)	AUG '52
Tot. Index..	**365**	**365**	**363**	**303**
Machinery	320	325	298	
Electrical Machinery	410	403	354	
Autos	302	293	172	
Other Transportation	591	589	551	
Other Metalworking	364	360	302	

(*) Estimated (p) preliminary (r) revised

The rate of metalworking operations does not reflect the dire forebodings of the pessimists.

It continues near the post-Korean peak, at 365 on the American Machinist index.

It probably will slide off some this month, but not seriously.

• • •

Fourth quarter employment and working hours will remain at a high level in Metalworking.

Orders will be down. But chances are that they will be healthy in size compared with any other time than the recent past.

Demand for both capital goods and consumer items is less. Worst sector is the farm implement and tractor industry, which is suffering seriously from the shrinkage in farm income.

• • •

New business in "special-industry" machinery, like steel mill and paper-making machinery, is off as industry capacity catches up with consumption.

Automobile and household appliance dealers are loaded with merchandise, in many cases. Price concessions at the retail level are very wide.

Makers of heavy electrical machinery are still going strong and have substantial backlogs. No change in capacity operations is expected this quarter or early in 1954.

• • •

Impact of defense work continues strong. Typical of conditions is the aircraft parts industry.

Many companies have been forced to do a considerable amount of rescheduling as military cutbacks and cancellations came through.

That usually has meant elimination or drastic slashing of subcontractors' operations. It has not been felt so much by the prime contractors, who have brought work into their own plants.

• • •

Full schedules will be maintained in parts makers' factories well into next year and perhaps longer.

Some of the components parts people, like bearings manufacturers, are doing well, though production is running ahead of sales.

Automobile parts makers have been fairly hard hit by "hold" orders from Detroit, only a portion of which can be attributed to the General Motors fire. They look for more liberal releases the next 60 days, however, and hope to finish out the year in good shape.

• • •

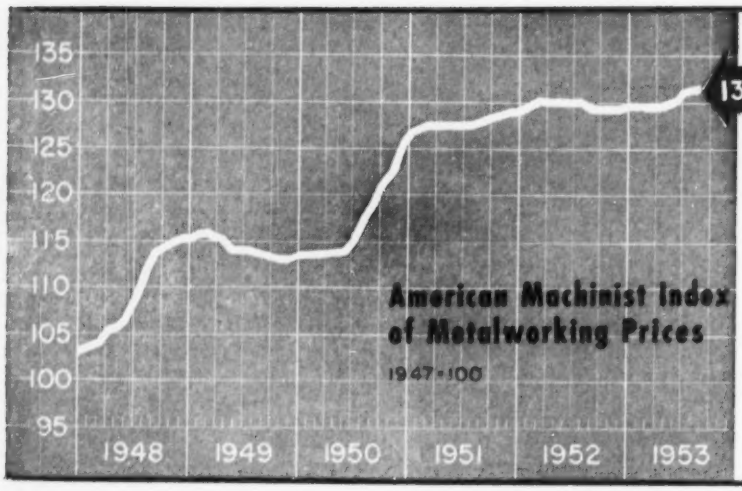
The earth-moving equipment business is making a fine showing. An important company, typical of the industry, reports third-quarter shipments up a little from last year, but the fourth quarter will be down as much as 10%. Modest reductions in employment are being planned.

Inventories are less of a problem now than they were in certain metalworking lines. Purchasing agents have been going slow in replenishing stocks of materials and parts.

New orders for industrial supplies and machinery are 40% the base period of July 1948, according to the new orders index of the American Supply and Machinery Manufacturers' Association. The latest figure of 140 for August compares with the all-time high of 239 in February 1951 and low of 129 in August 1952.

Peak for this year was 188 last March. The index gages the volume of orders from distributors who in turn supply industry.

Gaging Business



PRICE INDEX

	SEPT '53(*)	AUG '53(p)	JULY '53(r)	AUG '52
Total Index	**131.9**	**131.8**	**131.5**	**129.6**
Metalworking Machinery	**140.9**	**140.8**		**137.9**
Other Machinery exc. Electrical	**136.3**	**135.9**		**132.2**
Electrical Machinery	**130.0**	**129.9**		**124.7**
Fabricated Metal Products	**128.5**	**128.2**		**128.0**

(*) Estimated (p) preliminary (r) revised

For the first time since World War II, total US industrial output was lower in September than in August.

Usually, business bounces back from its summer lull along about September.

But this time, general business activity dropped because of declines in steel output and automobile production.

August wasn't too good, either. Twelve of 14 major manufacturing industries recorded lower rates during that month than earlier in the year.

Only exceptions were the chemical and paper industries, both of which continue to show strength by hitting record output in August.

And, on the other hand, non-durable goods output continues to hold up well.

• • •

Labor supply and demand are in the best balance in two years.

Labor Dept classifies industrial regions this way: 18 areas with substantial labor surpluses; 85 as surplus labor areas; 76 balanced-supply areas; and only three areas listed as having labor shortages.

But factory employment in August showed the least gain over July since the end of WWII. Nonfarm employment in August was down 1.2 million from August 1952 totals.

• • •

Many plants cut operations in September, laying off production workers in some cases: in other cases, cutting the work week. This adds up to lower future economic activity.

• • •

Business failures, a sensitive indicator of which way the economic wind blows, totalled 700 in August — 18% more than Aug '52.

• • •

Cost of living hit a new high in August — 0.6% ahead of a year ago — and the sixth consecutive month to show a rise.

Wholesale prices and farm product prices rose during the month, too. But industrial prices have remained fairly stable, may even drop.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	255.6	253.2	246.7
Steel ingot operation (thousands of tons)	2,139	2,144	2,195
Electric power output (million Kilowatt hours)	8,354	8,395	7,625
Production of automobiles and trucks	140,678	146,912	141,228
Engineering construction awards (*Eng. News-Record* — millions)	$382.6	$341.2	$234.3

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1935-1939 = 100)*	235	236	228
Index of durable manufactures production (1935-1939 = 100)*	307	311	290
Durable goods manufacturers' sales, millions*	$13,448	$13,046	$9,777
Electrical machinery manufacturers' sales, millions*	1,367	1,478	1,106
Other machinery manufacurers' sales, millions*	2,076	2,089	1,942
Durable goods manufacturers' new orders, millions	11,921	12,456	11,140
Electrical machinery manufacturers' new orders, millions	1,523	1,189	1,174
General machinery manufacturers' new orders, millions	2,048	1,946	1,916

* Seasonally adjusted

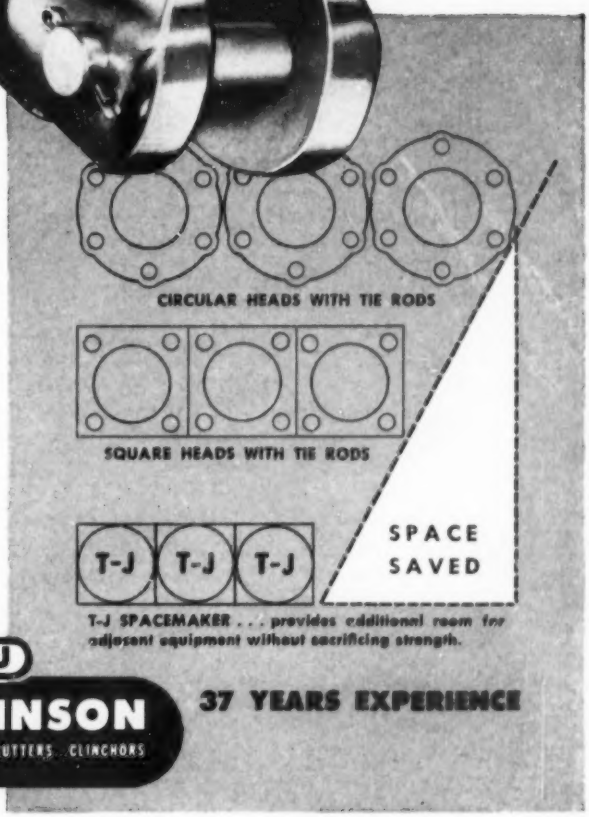
LESS SPACE!

extra high safety factor!

NEW T-J Spacemaker AIR CYLINDERS

These new T-J Cylinders *save up to 40% in mounting space*—with streamlined design that eliminates tie rods. They're *super rugged*—extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, hard chrome plated piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

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RIVETORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

37 YEARS EXPERIENCE

UNQUESTIONED AUTHORITIES in THE TOOL ROOM...

SHEFFIELD

Precisioneire Internalchek—checks holes .120" up to 1" in diameter—amplification 10,000 or 20,000 to 1. ☐

Precisioneire Surface Finish Comparator—30 to 500 micro inches r.m.s.—now widely used on shells. ☐

Precisioneire Gage Block Comparator—50,000 or 100,000 to 1 amplification—quick, accurate check. ☐

New Sheffield Airetest Indicator—repetitive readings from any direction—ask for a demonstration. ☐

N-6 Electronic Internalchek—checks I.D.'s from .250" to 12"—most widely used of all internal checkers. ☐

Electronic Height Gage—vertical range 18", amplification 1,000 to 1—new toolroom surface plate accuracy. ☐

Electronic Horizontal Externalchek—12" capacity, 1,000/2,000 to 1 amplification. It's new but proved. ☐

Electronic Leadchek—capacity 36" between centers and up to 10" dia.—more in use than all others of this capacity. ☐

Tool Room Visual Gage—amplifications 500, 1,000 and 2,000 to 1—most versatile and foolproof comparator. ☐

High Amplification Visual Gage—5,000 and 10,000 to 1 amplification—ideal for gage checking in the Tool Room. ☐

Floating Carriage Comparators—diameters and P.D.'s up to 14"—quick, accurate checking of cylindrical work. ☐

Type TS Leadchek—capacity 18" in length, 8" in diameter—checks lead of internal, external and taper threads. ☐

CHECK THIS BOX X for any instrument in which you are interested. Tear this sheet out, attach to your company letterhead and mail. Engineering data will be sent.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

What More Do You Want?

Why all the weeping over the gradual fading out of the so-called super-boom in business?

Scarcely anyone expected the phenomenon of the super-boom, in the first place. Everyone in Metalworking was pretty happy early in 1952 before the super-boom suddenly started. Business was very good then. In fact, it was better than ever before in peacetime.

When the super-boom became an actuality, no one expected it to last. And it hasn't. But it has stayed longer than anyone dared to think.

Now it is slowly receding and soon will be a thing of the past. But by what method of reasoning can that be termed a calamity, as the pessimists would like the world to believe?

The facts at hand set at rest any morbid ideas about the possibility of serious economic distress in the next year.

Take our expenditures for national defense, to begin with. The production rate will be off some, to be sure, but it still will be very high. Actual military spending in fiscal 1954 (up to next July) will amount to about $43 billion. For the 1955 fiscal year (after next July 1) it will be down only 5%, according to Defense Secretary Wilson.

Realistic automobile makers look for a minimum of 5 million passenger cars to be assembled in 1954. Realistic manufacturers of TV sets predict an output of 6-6½ million units next year. Radio set production promises to be somewhere between 10-13 million units.

The household appliance people are not wailing. They are setting their sights fairly high for '54. New housing starts are estimated to total 900,000 units, down some from this year's figure but still very good by any pre-Korean standard.

This recital of evidence to support the thesis of good business ahead could go on and on, but space forbids. This is not to say, however, that everything is rosy. It isn't.

The farm economy, for one thing, is out of kilter with the rest of the national economy. Farmers haven't as much money to spend as they had. And they are more cautious about spending what they have. The farm implement industry, as a sample, has been seriously affected and a recession has already hit it.

But, on the whole, industrial production should stay not far below the dizzy level where it has been lately. The decline is likely to be in the neighborhood of 10% to 15%.

That still will find Metalworking operating within the range that prevailed in the first half of 1952.

If that happens, as now indicated, the months ahead will not be the time to lament. They will be busy days. And for most metalworking companies they should be prosperous days especially for manufacturers with aggressive sales organizations and well-designed products.

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FORD

bet a billion on new tooling . . .

. . . Here's how and why the bet is paying off

Ford is rapidly expanding and modernizing
its plants to support its climb toward sales leadership
in the automobile industry.
Shown here for the first time are examples of methods
and tooling that will have an impact
on Metalworking for years to come

American Machinist SPECIAL REPORT NO. 346 TO THE METALWORKING INDUSTRIES

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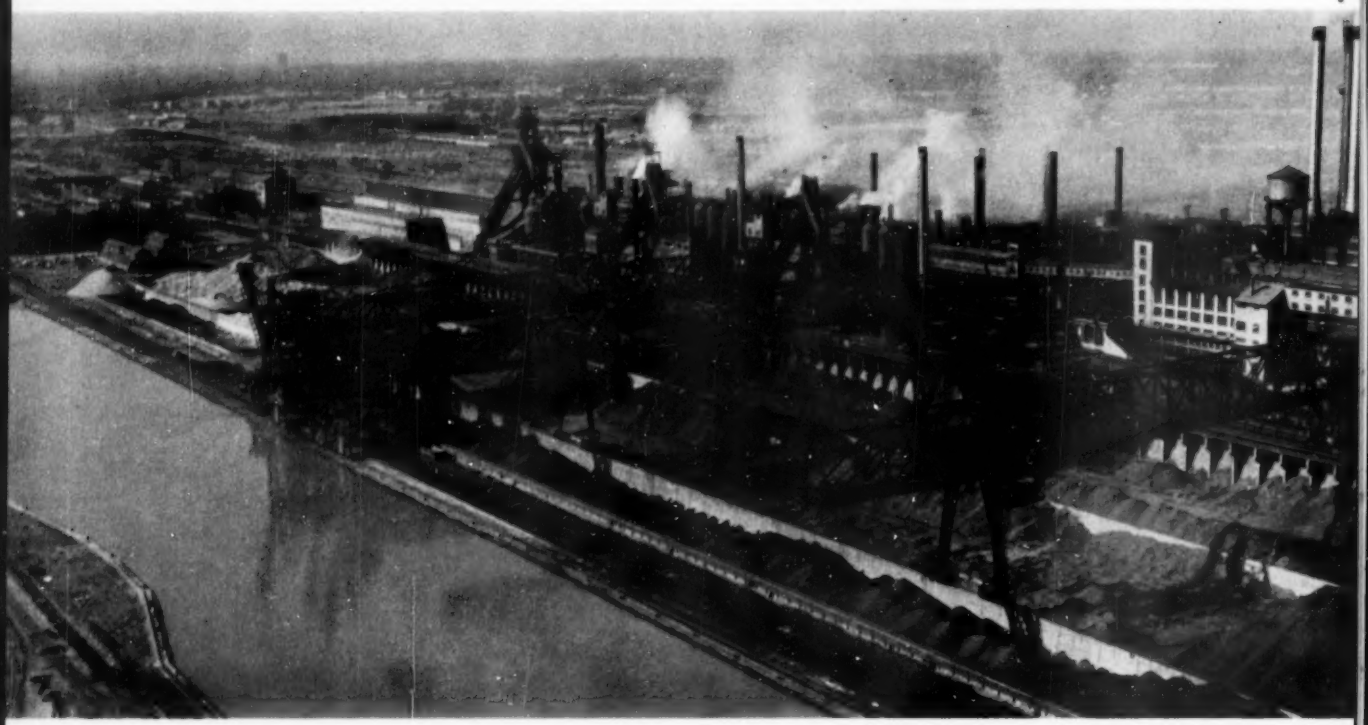
FORD BET A BILLION ON NEW TOOLING



world's biggest modernization program

In this, its 50th-anniversary year, the Ford Motor Company is earning dividends on the most ambitious expansion and modernization program ever undertaken by a metalworking organization:

1. More than $900 million had been spent between Jan. 1, 1946 and Jan. 1, 1953. To complete programs approved through May of this year, an additional expenditure of more than $500 million will be made. Such sums are commonplace in government, but staggering to private enterprise. Furthermore, these vast expenditures are self-financed.

2. Ford had the jump, as a result of its spending, on rivals in respect to automation, use of high-speed presses, and application of the latest fast-cutting machine tools. This has given Ford six years of experience in creation of the practical "automatic factory."

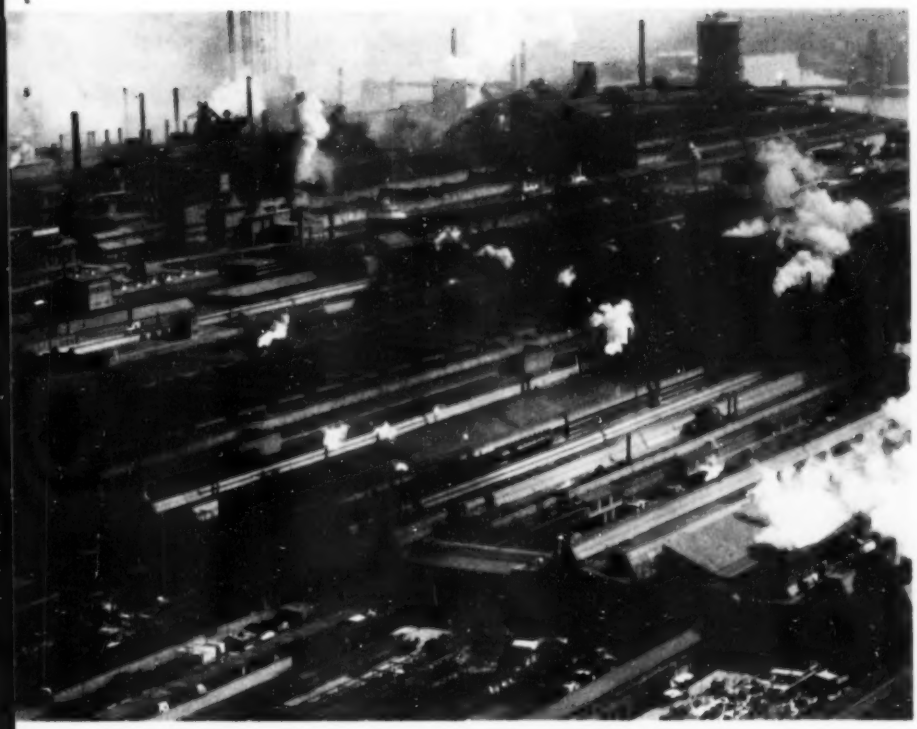
3. In 1950, with still a good part of its expansion program incomplete, Ford had its best year of production and profit. It reached nearly 9000 units a day with facilities rated at only 6300. This was the last postwar year unaffected by government-ordered cutbacks.

Ford is now back in second place in automotive sales, and is getting its productive capacity lined up to overtake its chief rival.

This drive to regain sales leadership began shortly after Henry Ford II became president on Sept. 21, 1945. A thorough review of the company's position was made. Potential automobile sales for the whole industry were charted for a number of years ahead. Manufacturing costs and production capacity were examined; and estimates were made of what new facilities would be needed to support sales leadership. In addition, studies were made of the attitudes of Ford workers toward the company, and of personnel and administrative policies. Work along these lines comparable to that involving production was done, and many new policies have been instituted. Finally, a detailed over-all plan was drawn up and placed into orderly execution.

To understand Ford's problem in modernization, and to realize why all this money had to be spent; take a look at Ford in 1945:

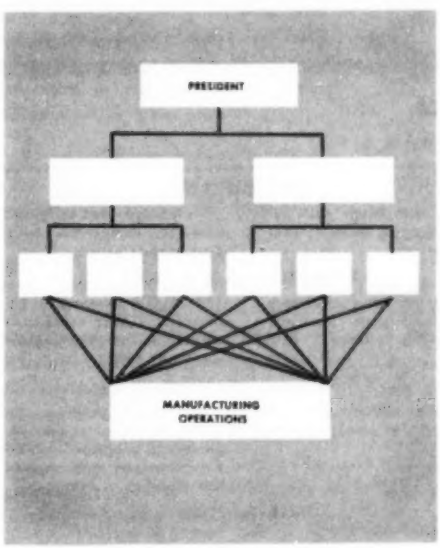
Principal manufacturing assets were the Rouge plant—the largest single metalworking factory in the world—and the older Highland Park plant. Originally these facilities were geared to produce 10,000 Model T's a day—in fact, the record day's output was (in 1925) 9109 units.

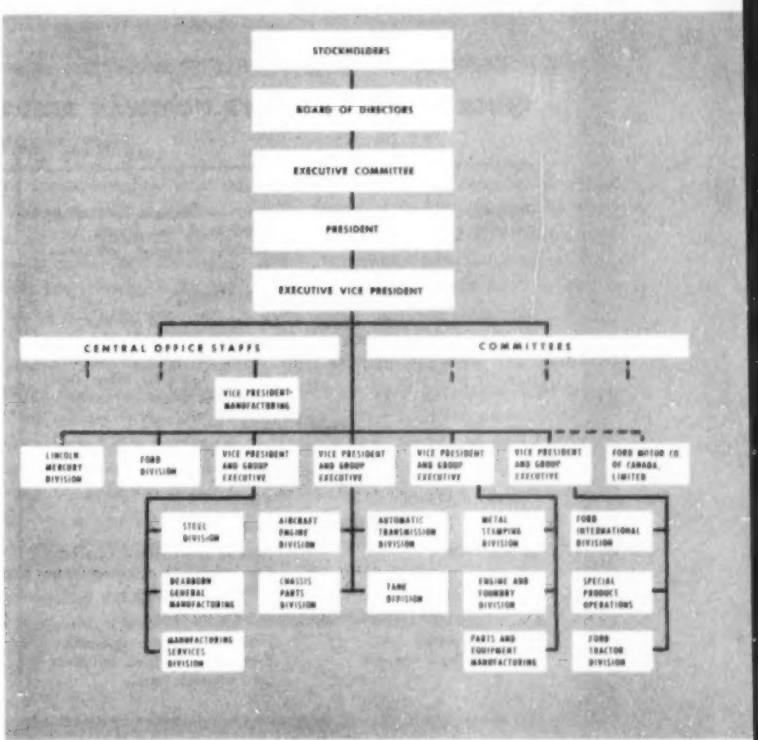


ROUGE PLANT — the largest metalworking plant in the world —as seen from the ore docks and from above the Dearborn Stamping Plant. The Rouge remains the hub of the Ford industrial complex. Almost every building and operation on this 1212-acre site has been rearranged, modernized or expanded as part of the company's master plan to back sales potential with adequate manufacturing facilities

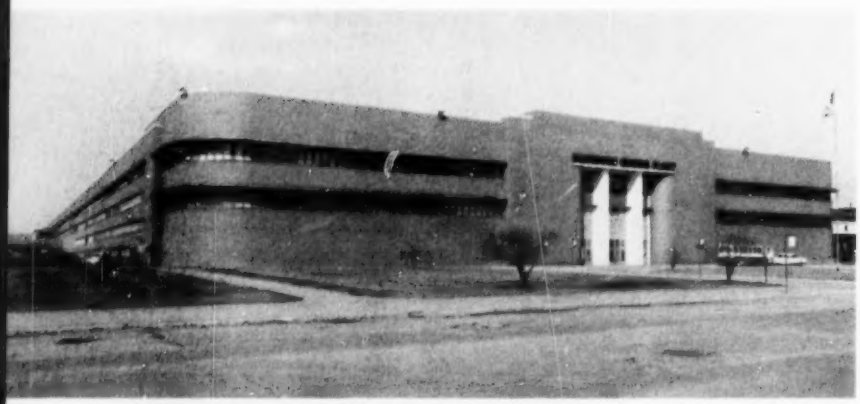
MANAGEMENT'S REORGANIZATION — Before 1945, a few men attempted to manage the complex Ford organization, from manufacturing to sales and service. Now by dint of much reorganization, operations are broken into logical divisions. Each division has its own staff for manufacturing engineering, production programming, plant engineering, quality control and finance. Its product must be made at a profit. Each division must be competitive with the best outside source or against a norm established by the Central Staff

moves into its second billion





FORD BET A BILLION ON NEW TOOLING



NEW Dearborn Engine Plant (above) replaces old Rouge motor plant (below). New plant will make Lincoln and Ford V-8 engines

Ford had a policy of making at least a portion of its needs in parts and materials in order to check costs, but outside of engines it was not self-sufficient.

When the V-8 came in, continuous modernization and rearrangement went on at Rouge in a struggle to keep up productive volume on the more and more complex product. But by 1950, the Rouge could only make 6000 V-8 engines and 1700 6-cylinder engines per day. Stamping production at Dearborn accounted for less than half of the daily requirements, and the equipment in all plants had become outmoded. In short, Ford started with enough productive capacity, but the growing complexity of the product —a modern V-8 car has over 15,000 parts —many times more than the Model T—had squeezed down on the old facilities. Ford *had* to invest heavily in modernization to keep up with the industry and the market. That the company did so as positively as these examples show is a testimonial to progressive and aggressive management.

REORGANIZATION FOR PRODUCTION

Ford's current management realized that it must taken an important step if plant modernization and expansion were

QUICK FACTS ON FORD'S POSTWAR RESURGENCE

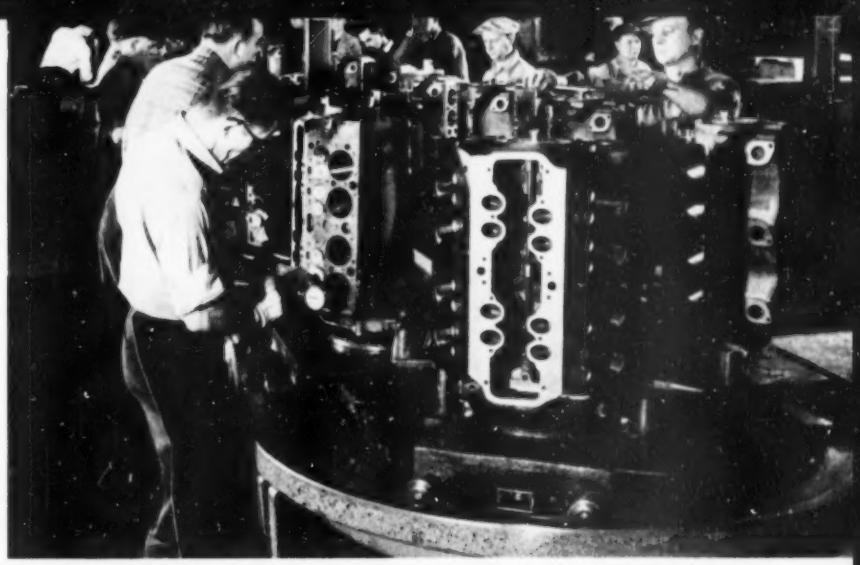
1945	1953
MANAGEMENT	
One-man authority supported by a small group	Modern line and staff setup, organized for depth and quality. Training programs in force.
MANUFACTURING ACTIVITY	
Concentrated at the Rouge Plant in Dearborn	Rouge Plant still the hub, but expansion was put elsewhere to gain "breathing room," tap new labor supplies, get closer to assembly
PLANT AREA	
28,400,000 sq ft	66,600,000 sq ft
EMPLOYMENT	
122,289 (in 1940)	193,874
FINANCIAL POSITION	
In the "red"	Able to self-finance $1.5 billion expansion program, with more to be added
MANUFACTURING ORGANIZATION	
One huge entity controlled by a few men	Fifteen separate operating divisions, managed by their own organizations
COST CONTROL	
Vague, with Rouge costs often exceeding those of vendor's prices	Divisions operated as "profit centers" competitive with best outside source
ENGINEERING & RESEARCH	
Small Engineering Laboratory with inadequate research and testing facilities	$80,000,000 Research & Engineering Center nears completion. By Jan 1952 employment was 4600
HUMAN RELATIONS	
Start of a positive program of beneficial employe relations	Considerable progress on Henry Ford II's "human engineering program"—supervisor, foreman and apprentice training, safety
SALES POSITION	
Third in industry	Second in industry
PRODUCTION CAPACITY	
Choked by obsolescence and concentrated activity	Rapidly nearing parts-manufacturing capacity of chief rival; costs are favorable because of automation, high-speed machining, and latest type equipment

to achieve the desired results. This step was the decentralization of management —that is, breaking down a large, highly integrated business into a number of smaller businesses, according to product or operation. By 1953, the company's organization had been revamped into 15 logical divisions covering manufacturing and assembly. Manufacturing divisions are assigned to four groups: See chart.

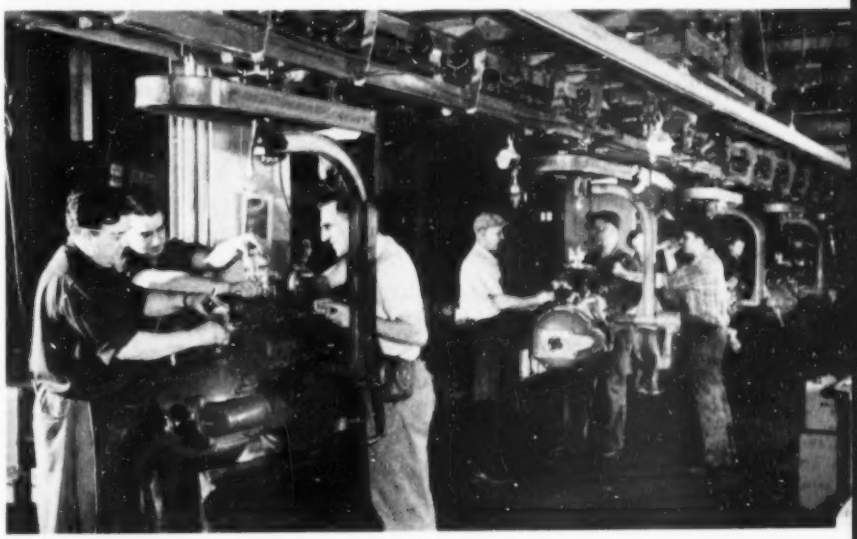
Now, instead of one small management group attempting to run the entire Rouge area and outside plants, each division has a specialized management team responsible to a vice-president for its operations. This team determines its own manufacturing processes, engineers its own plant layouts, schedules its own production, sells its own products and keeps its own books. Company-wide planning and policy remain the function of the Central Office Staff.

Control is exercised by means of the "profit center" system. To insure divisional efficiency, each division, as a profit center, determines the prices at which divisional products will be sold to the consuming divisions. These prices are determined in several ways: (1) by the market prices, as in the case of steel or glass, (2) by the vendor's price if part of Ford consumption is purchased, and (3) by negotiation between the buying and selling profit centers for a wholly made Ford product like the Ford V-8 engine. In the last case, the theoretical price charged by a highly efficient producer is the norm.

By means of the profit-center concept, Ford divisions are kept competitive with outside producers. The managers are given the facts and they have the incentive to reduce costs. Operating results of the profit center high-light the opportunities for the greatest profit opportunities. Profit objectives are established by the Executive Committee of the company, based on the earnings records of the most profitable companies in a particular industry. Thus, the stage was set for modernization on a continuing basis—not only the huge program now reported. If the minute costs on any given operation or part are shown to be excessive, the divisional manager can immediately order his tool engineering and process engineering groups to make replacement studies.



FLOOR-MOUNTED buggy-type conveyors did not utilize manpower efficiently and plant layout was limited



POWER-AND-FREE conveyor system applies automation to increase output and safety, to produce a better product

PLANT FACILITIES

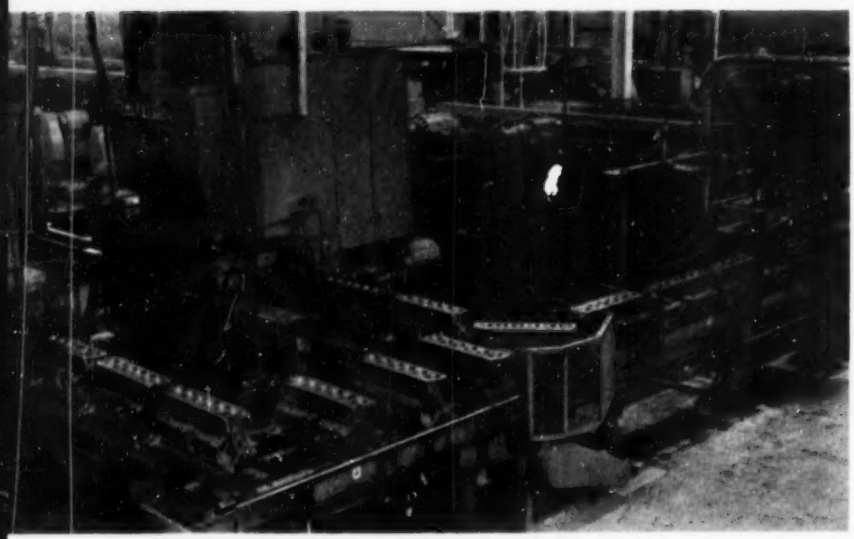
While Ford's management was being reorganized, major steps in modernization and expansion of manufacturing facilities were being undertaken. Decentralization of plants has nothing to do with decentralization of management.

Originally, the sum of $100,000,000 per year was allotted for building or buying new factories and for modernizing existing ones. But success of the first improvements opened up wider opportunities, defense needs came into the picture, and costs of new equipment and buildings increased. That is why the scope of the original program approached $1 billion. One might say that the half billion approved or committed this Spring, plus more to come, represents a second expansion program based upon the success of the first one and the management's current appraisal of its market opportunity.

Ford's decentralization program is so spectacular that people might think that the Rouge Plant is destined to play a minor role. The facts belie this supposition. Actually, the plant has been both modernized and expanded to fit in with Ford's master plan for production.

Since its inception, the Rouge Plant has been one of the world's most famous factories. Over the years, its facilities have been expanded or modernized many times. World War II produced a set-back. Unlike many manufacturers, Ford did not refurbish its machines, tools, etc., at government expense. Instead, it assigned such

FORD BET A BILLION ON NEW TOOLING



SYMBOL OF AUTOMATION—Machining of 6-cylinder blocks at Cleveland Engine Plant is speeded by automatic loading, unloading and transfer

facilities as it had to defense work, and erected buildings for the government on Rouge property. When the plant was converted back to automobile production, much of the equipment was worn out or showed the effects of all-out wartime effort.

Rehabilitation of the Rouge took top priority in the postwar period. Expansion began by purchase of the government-owned buildings — adding 30% to plant space in existence in 1942. Other additions throughout the 1212 acres of Rouge property raised total space to 15.5 million sq ft. Total expansion since 1942 amounts to 65% in floorspace.

Major rehabilitation programs at the Rouge include:

Steel Division—A multi-million modernization program, resulting in increased ingot production and balanced sheet capacity with ingot capacity.

FORD MOTOR COMPANY EXPANSION SINCE WORLD WAR II

BASIC MATERIALS:

Rouge steel ingot capacity increased.
New ore ship, *William Clay Ford*, in service, 1953.
New coke ovens, rolling and finishing equipment completed 1953.

CASTINGS, ENGINES AND STAMPINGS:

Dearborn Stamping Plant, Iron Foundry, Specialty Foundry, and Engine Plant remodeled and improved, 1950-53.
New Cleveland Engine plant opened 1951.
New Cleveland Foundry opened 1952.
Plans for second Cleveland Engine plant announced 1953.
New Buffalo Stamping Plant completed 1951.
New Stamping Plant at Cleveland announced 1953.

FORGINGS, MACHINED PARTS AND SUB-ASSEMBLIES:

Mound Road Division plant in operation, 1949.
Canton Forge Division purchased and in operation, 1948.
New Automatic Transmission Division plant in operation at Cincinnati, 1950.
New Livonia Tank Division plant completed 1952, to convert to automatic transmissions in 1954.
Aircraft Engine Division operating 6,600,000 sq ft government plant at Chicago since 1950.
Parts and Equipment Manufacturing Division gains Monroe plant (1949), expanded Ypsilanti plant in 1948 and again in 1952-53.

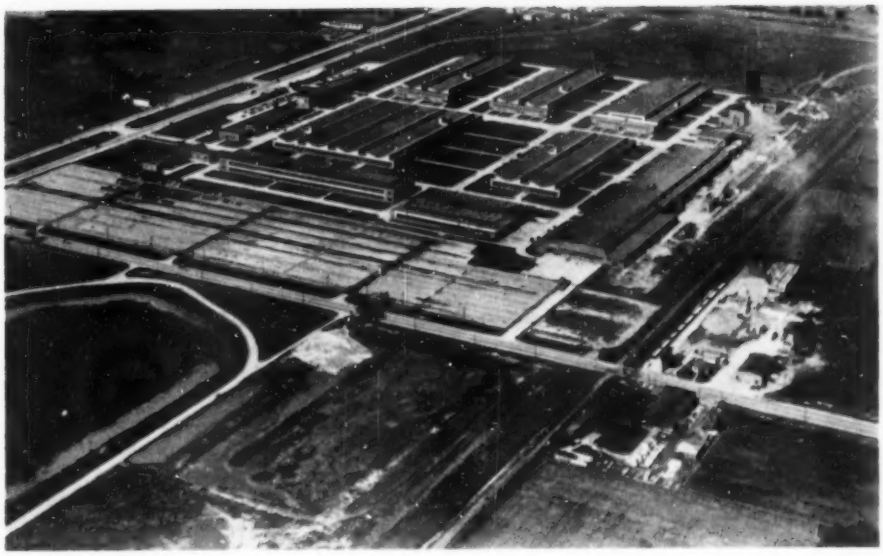
ASSEMBLY AND DISTRIBUTION:

Ford Division gains new Atlanta and Kansas City facilities, plans new assembly plants at San Jose, Calif., Mahwah, N. J., and Louisville, Ky., rebuys Norfolk, Va., plant. Builds 16 new parts depots, modernizes others.
Lincoln-Mercury Division gains new assembly plants at St. Louis, Mo., Metuchen, N. J., Los Angeles, Calif., and Wayne, Mich.; new parts depot at Detroit.

OFFICES, LABORATORIES AND STUDIOS:

Parts depots provide new offices for field sales personnel.
New Administration Building for Central Staff at Dearborn.
New office building in Rouge for five operating divisions.
Four buildings of 750-acre Research and Engineering Center completed at Dearborn, 1953.
Ford Rotunda renovated and reopened as hospitality center, 1953.

BUFFALO STAMPING PLANT has high-speed presses in automated lines. Such lines can produce more and their efficiency is high



MOUND ROAD PLANT typifies Ford's decentralization dictated by economic factors. This plant of manageable size makes 300 parts

Dearborn Engine Plant—The former Aircraft Engine Bldg, has been equipped with completely new automated production lines for Lincoln and Ford V-8 engines. This plant, plus the existing Cleveland Engine Plant and the planned engine plant in Cleveland, will supply the engines for Ford's drive to regain sales leadership. The old Motor Plant will be available for other purposes.

Dearborn Iron Foundry—Most modern techniques have been introduced, working conditions improved. Eventually capacity at Dearborn will be greater than that of the new Cleveland Foundry.

Dearborn Specialty Foundry—The old Steel Foundry has been converted to make castings by a new process that minimizes machining.

Dearborn Stamping Plant—At the onset of the expansion program, this plant could produce roughly 45% of Ford's then requirements for stampings. Even with rearrangement and modernization, it could not meet the company's needs. Hence, the Buffalo Stamping Plant was erected first, and then the Dearborn plant was modernized by replacing old presses, adding new presses, and re-arranging the materials-handling lines.

DECENTRALIZATION

In 1942, exclusive of car assembly plants, Ford had only two domestic manufacturing plants outside of Michigan. In developing its master plan for development of the company, the management considered the usual economic factors for location of new facilities—accessibility to raw materials and markets; availability of labor, land and utilities. Because of these factors, Ford has established or planned additional plants in Cleveland, Buffalo, Cincinnati and Canton. Most of the new plants are restricted to 1 to 1.5 million sq

ft to be of convenient size for control by local management. Major plants are:

Forgings — Purchased Canton Forge Plant to take advantage of lower steel costs, and allow conversion of obsolete forging capacity at Rouge to other purposes.

Stampings—Opened Buffalo Stamping plant, which is fully automated and equipped with high-speed presses. With Bethlehem's Lackawanna plant nearby, material costs are lower, shipping costs to assembly plants are reduced. Bringing this plant into production provided an opportunity to rehabilitate the Dearborn Stamping plant. Another stamping plant, scheduled for Cleveland, will raise Ford's capacity to the point where it will be equipped to support its drive for sales leadership.

Engines—The Cleveland Foundry has the capacity to support both the existing Cleveland Engine Plant (Ford OHV-6 and Mercury V-8 engines) and a new V-8 engine plant now committed. These plants, plus the Dearborn Engine Plant, should have a capacity more than double Ford's rated capacity in 1942.

Parts Plants—Acquired Mound Road Plant, Detroit, for processing about 300 parts. Purchased and modernized Monroe, Mich. Plant to handle operations formerly done at Flat Rock, Mich and Hamilton, Ohio. Village-industry plants reduced to those considered practical from cost standpoint.

Automatic Transmission Plants—Consumer demand for torque-converter transmission on Ford and Mercury cars will bring the addition of a new transmission plant at Livonia, Mich, to supplement the output of the Cincinnati Transmission Plant. The new plant will occupy the 1,500,000 sq ft facility now operated by the Ford Tank Division. Transmission manufacture will be underway there in mid-1954.

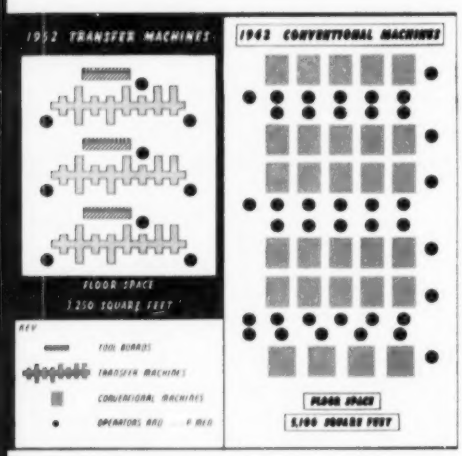
Addition, expansions and modernization projects will continue throughout the Ford industrial complex for several more years. Replacement of individual machines is going on all the time. Ford operates approximately 40,000 machine tools, reviews them every ten years, independently of any cost-cutting analysis arising from profit-center activities.

TECHNICAL ADVANCES

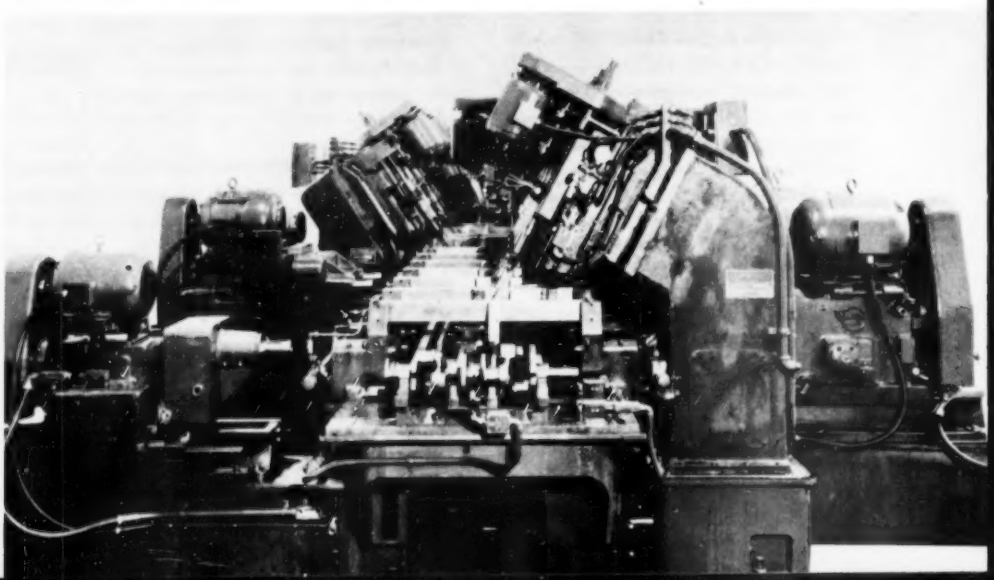
Ford does not regard money spent or plants built as the whole story. It also is immenseiy interested in technological progress—in constantly improved methods and processes that will yield greater productivity, high quality and increased profits.

The company's manufacturing executives have been quick to take advantage of new ideas and new systems in manufacturing, and, truthfully, it can be said that this company is leading the way in several very important new fields.

Without doubt, Ford's development of the automation concept is the greatest improvement in mass production since the advent of the assembly line. For details see AM Special Reports Nos 214, 303, 312 and 324. Along with this concept have come Ford firsts in high-speed ma-



FORD depends on modern machine tools to reduce minute costs. Chart shows that 29 machine tools in common use in 1942 would be needed to do the same work as three modern transfer machines (lower right) on the operation of drilling holes in six-cylinder crankshafts

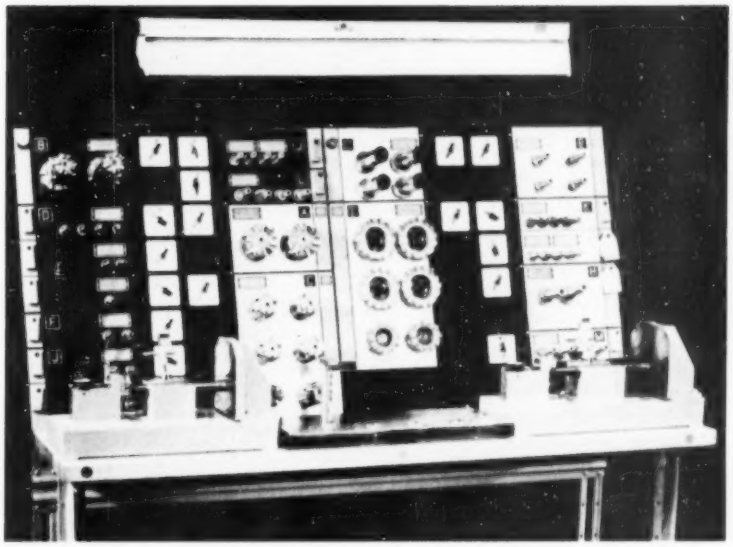


chining and high-speed presses. The engine machining line that operates at twice the customary output, the press line that runs at 16 to 17 strokes per min. instead of 6 or 7 strokes, are realities. Such lines, properly set up and handled, can have a much higher operating efficiency than the usual installation. Fewer lines making more parts per hour at lower minute costs can mean only one thing—more rapid amortization of the investment and a stronger competitive position.

The need for automatic handling devices in the automobile industry has been known since the first conveyors made mass production a reality in the 1920's. In an effort to reduce costs, it became obvious that a most logical place to realize savings would be a reduction in the time required to load and unload a specified machine. Out of this realization developed automation in its present form at Ford.

Automation introduces automatic handling and machining of parts in progressive production processes. Parts now are automatically ejected from machines and presses, transported between them, and loaded into the next machine. In many cases, this is accomplished without human assistance, thereby releasing manpower for other jobs.

While in the past, automation was considered as an afterthought, today it is envisaged when the plant layout is in the embryo stage. Machine locations and material flow now are dependent upon automation requisites rather than individual preference.



FORD'S TOOL-CONTROL board times the number of holes or cuts between grinds

Since the new machine tools now have graduated from the standard or single-purpose machine to the in-line multi-station transfer type, automation has made itself felt universally.

This is especially true in the manufacture of such engine parts as cylinder blocks, heads, crankshafts, and manifolds. The machine tool itself has been automated to a high degree. The next step has been to connect these automatic-in-line machine tools and presses with a system of unload, transport, and load devices that is equally automatic. This step has been accomplished by Ford, which is adapting automation to as many of its operations as possible. While it calls for substantially increased investment in facilities, automation pays off in lower manufacturing costs and improved quality.

Ford will continue to place emphasis upon automatic methods of manufacture.

Important gains will continue to be realized at Ford in respect to increased production, reduced costs, improved quality and better working conditions for employes by the further adoption of new machines and methods in manufacturing operations.

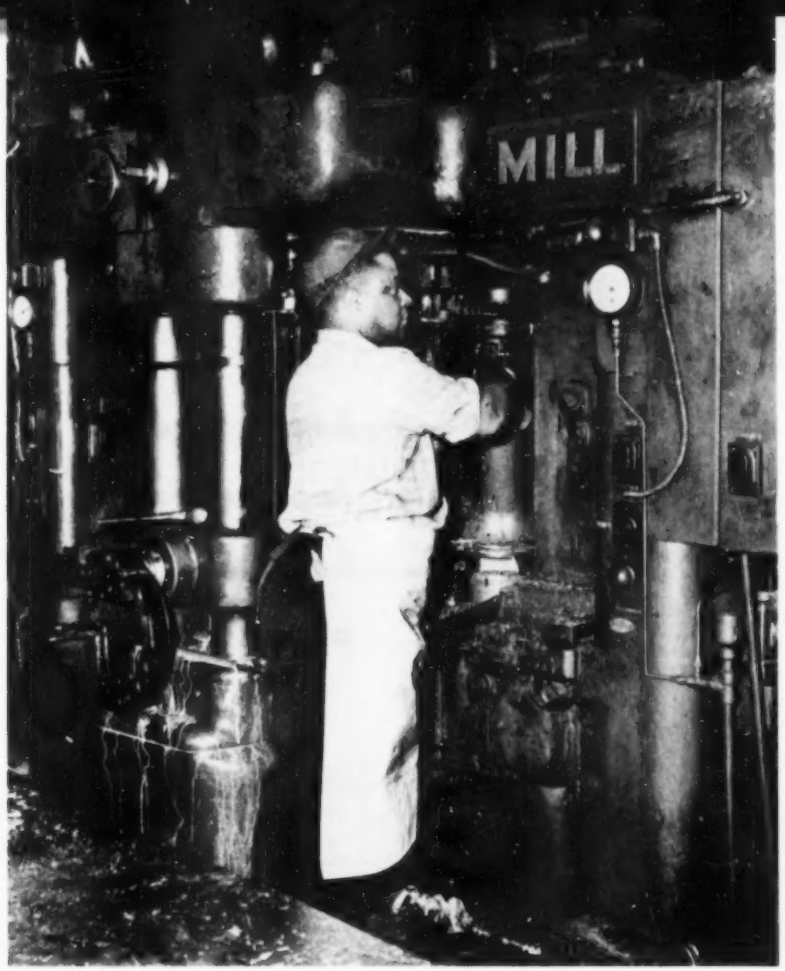
FORD HAS ALWAYS BELIEVED IN MODERNIZATION

During the 1929-1935 depressed years, Ford spent $35,000,000 on assorted modernization projects. Some of the features that we think ultra modern were then in use:

. . . Constant-temperature inspection rooms were put right in the plants
. . . Mercury-vapor lighting was installed in areas requiring a high degree of illumination.
. . . High-frequency portable tools were applied to assembly operations.
. . . An automatic piston-pin sorting machine was designed in 1933.
. . . Tolerances on some motor parts were held in 0.0001 in.
. . . Locating spots on the cylinder block were broached.
. . . Way-type machines were in use.
. . . More than 30 parts were machined with carbide tools.

press-broach slots quicker than miller

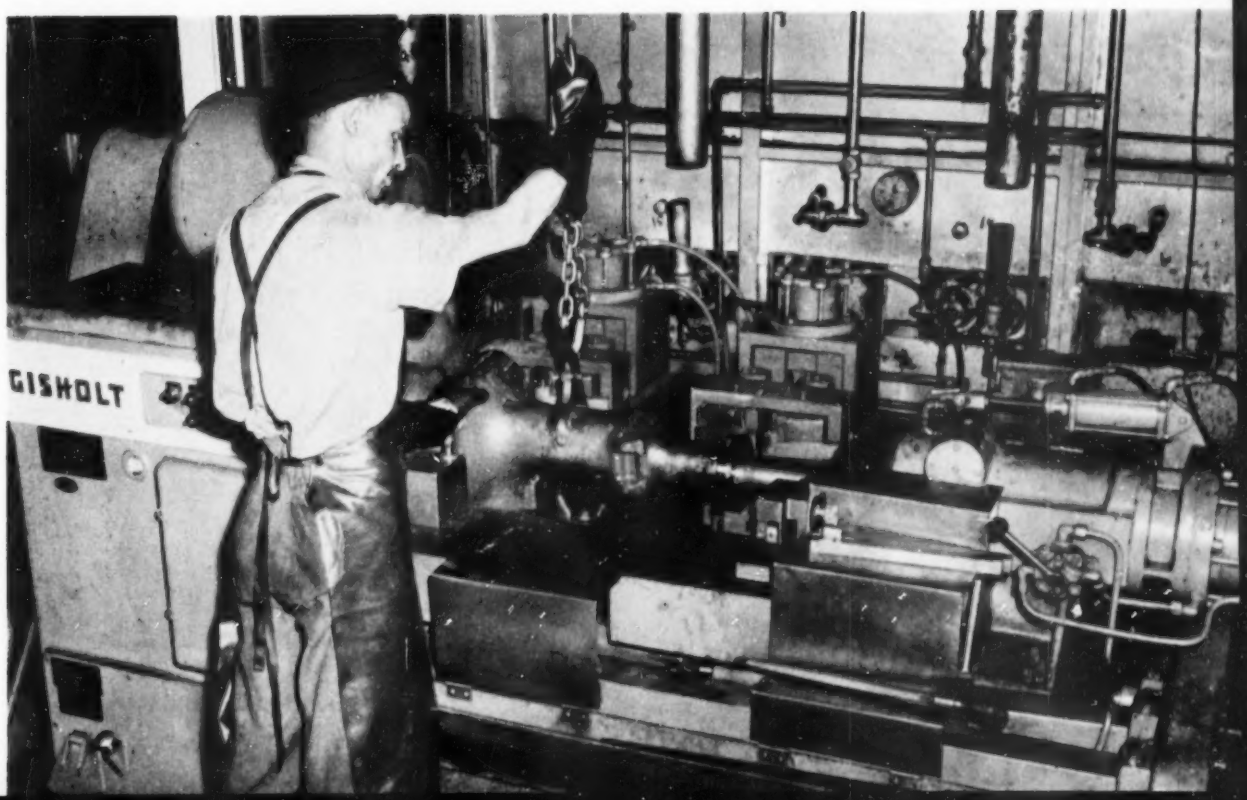
Machining the riser commutator slots was a slow, laborious job on a small milling machine. An operator was required to load the fixture, work the feeding and indexing mechanism, and unload the fixture. A much higher rate of production was attained at a press that was fitted with a broaching fixture. The operator now positions the part and trips the press to cut all 28 slots on each commutator at once. Parts are ejected automatically.

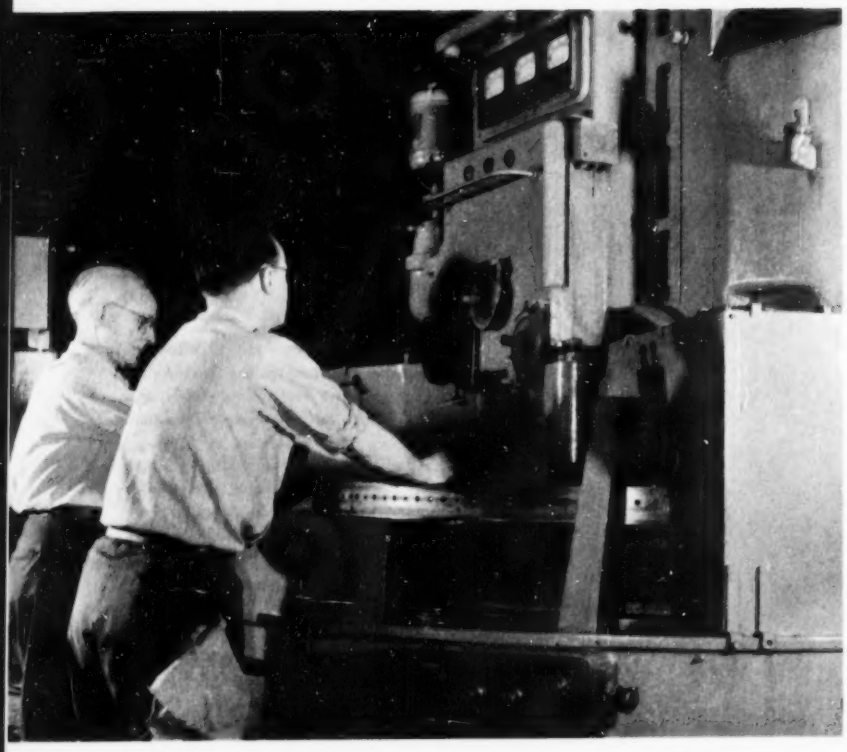


REAR-AXLE HOUSINGS

It was a difficult job to position rear-axle housings for tractors in three large vertical Roto mills, as done in the past. After installation of two automatic Gisholt lathes to do the same cutting work, two advantages were realized: The operations could be handled by two machines and two operators because the high rate of cutting made up for the third old machine; and the work could be lifted by small hoists to eliminate excessive operator effort. The operation here is rough machining.

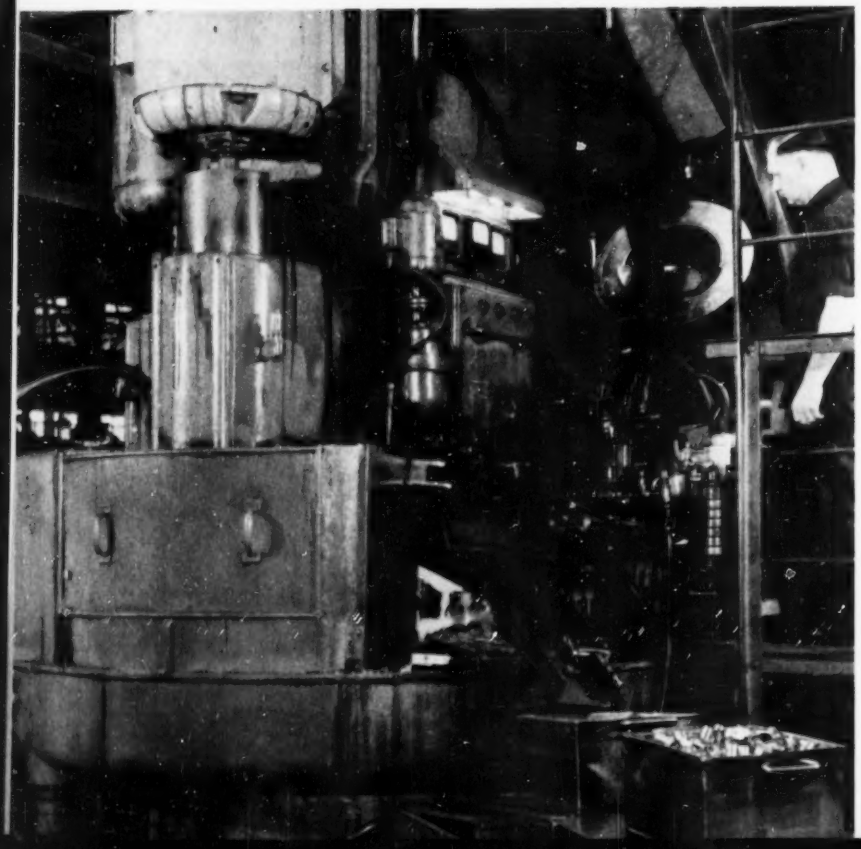
automatic lathes outproduce old mills 3 to 2



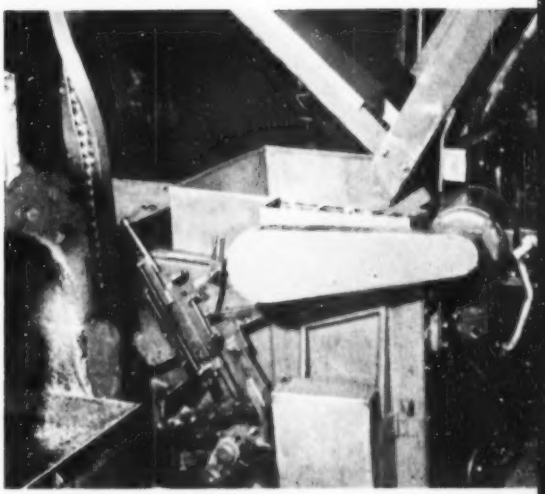


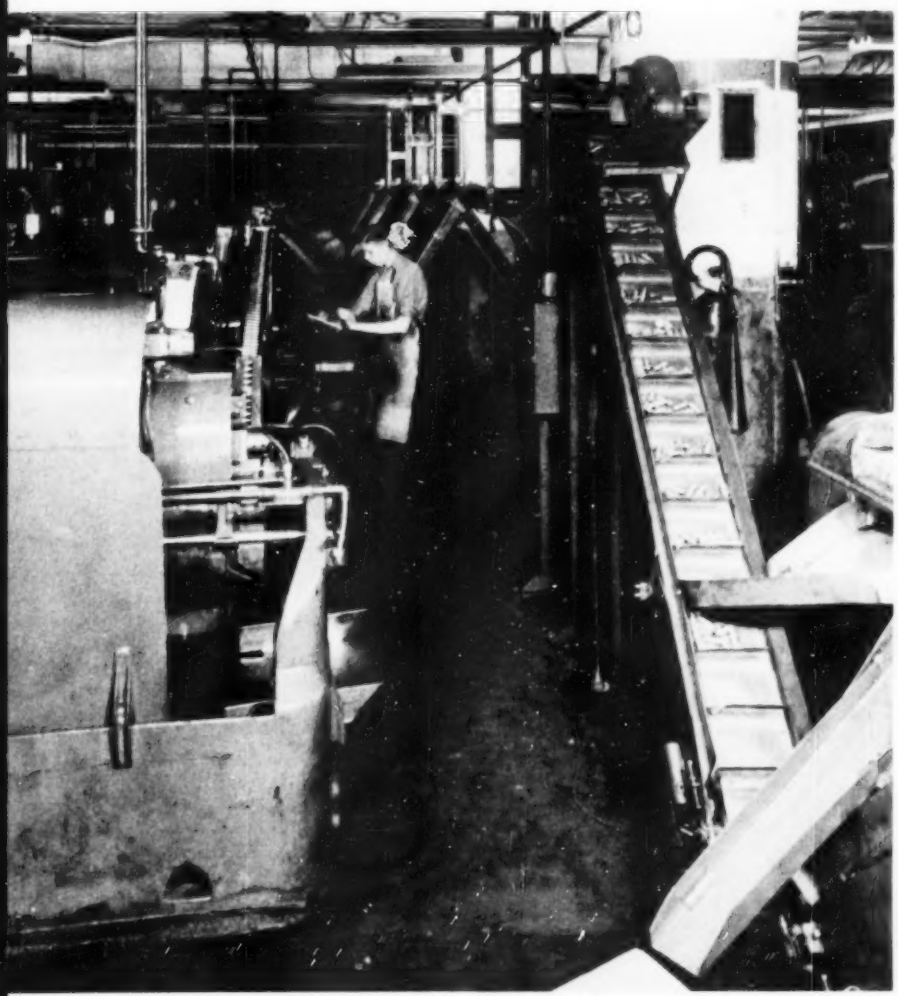
hopper feed improves handling at machine

Push-rod ends are finished on a Hanchett grinder in a fixture that is a horizontal plate with radial holes. The actual grinding operation on this job has not been changed, but handling prior to grinding has been improved to reduce the cost. Originally, push rods were carried to the machine and inserted in the plate fixture by hand; after grinding, they were—and still are—ejected automatically into a metal basket. Now, however, a conveyor delivers the rods directly to the machine, and drops them into a hopper that sorts and feeds them down to a locating mechanism that loads the fixture. Thus machine operation is completely automatic.



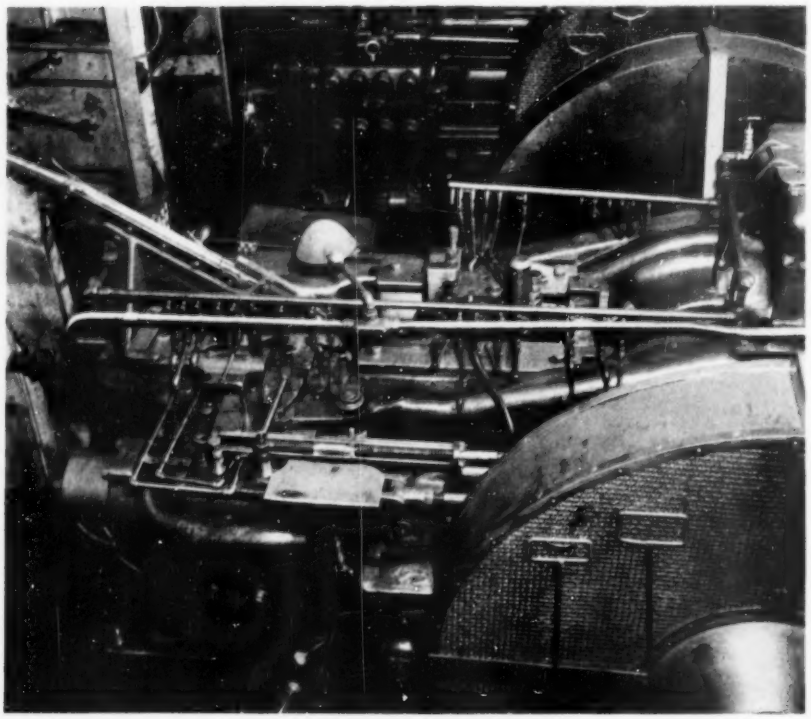
complete methods overhaul reduces exhaustive labor



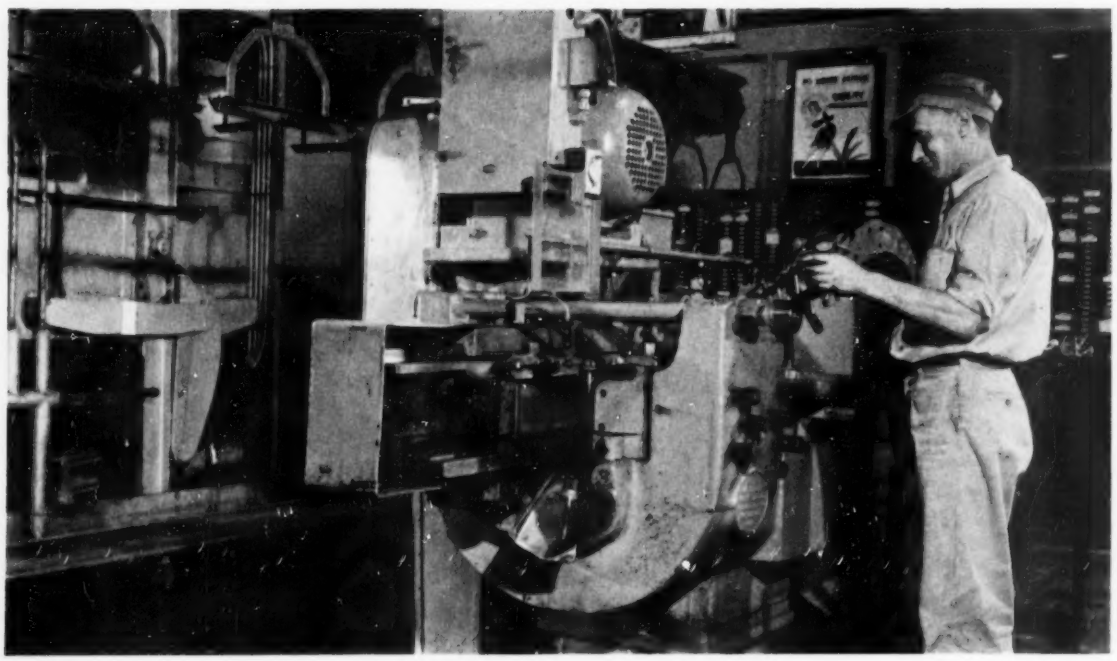


Permanent-mold castings of gray iron were machined in conventional operations on standard machines, including hopper feeds and sorting mechanisms. But a full analysis of the job showed many possible improvements, including changing the finish-boring job on the hole to a semi-finishing operation, then sizing the bore for final ID. Statistical quality control was applied to the whole process, resulting in more assurance in quality at a standard volume of 90,000 bushings per day. Hopper feeds were rearranged on Acme screw machines to allow one operator to handle two machines—thus reducing the possibility of human error. Selector feeds were added to grooving machines. A Tolhurst chip wringer was added to reclaim 4.75 gal. of coolant per day, which has added more savings to the job.

Heads and stems of engine valves must be straightened in relation to each other, which was originally done after heating in a furnace. Each valve was loaded in a heading machine, coined, and ejected. The operation also forged a 45° seat under the valve head. But when shell molding was introduced in valve casting, it was found possible to straighten the valves in two flat dies on a thread roller. The roller actually squares the head, straightens the stem, and reduces taper to a minimum, cutting out operations in stem grinding and releasing the header operator for other work.

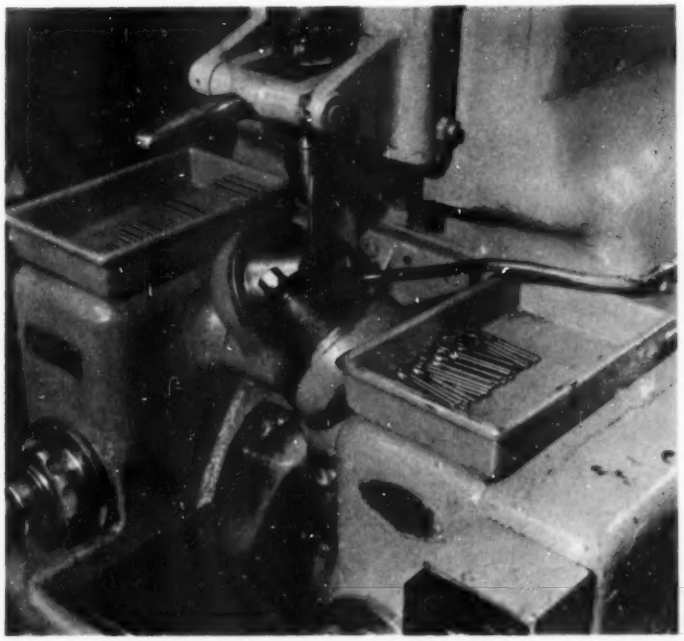


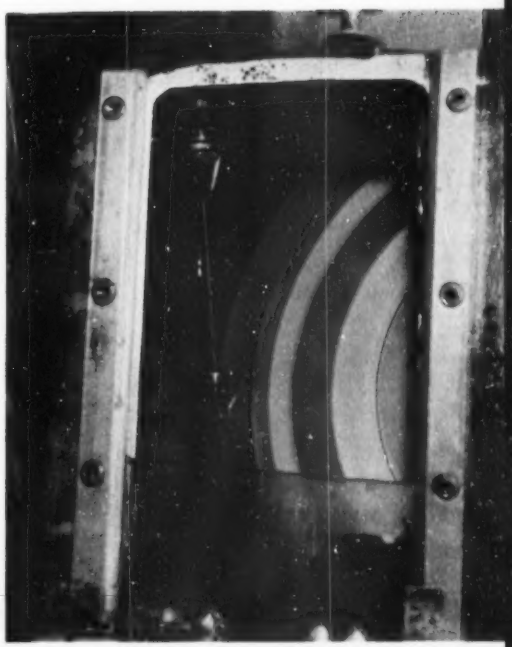
thread roller straightens valves to eliminate two grinding operations



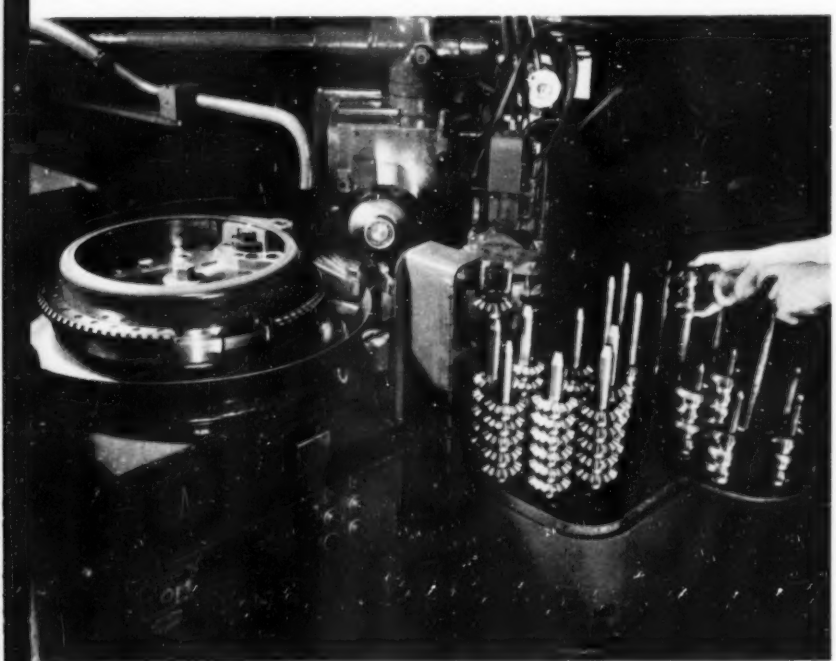
SMALL DRILLS

special machine flutes hardened drill blanks





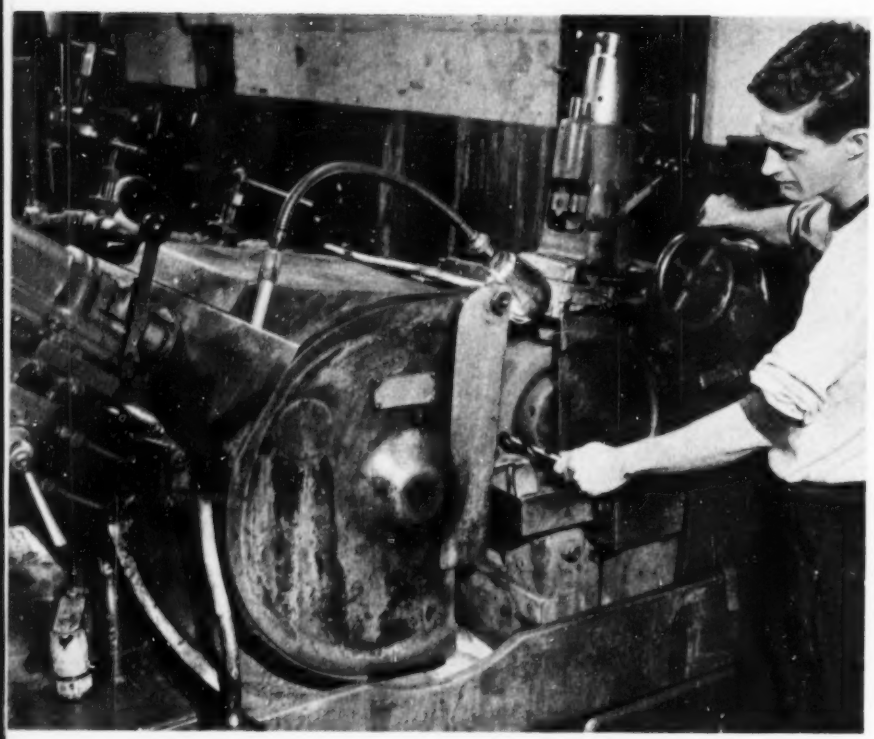
Production drills, used in Ford machine shops, are made in the plant to specification. The old method called for inserting a soft blank in the collet of a special bench machine equipped with two cutter spindles. The vertical work-holding spindle descended as the cutters operated, revolving to produce the helix in the drill. Two flutes were cut at once, but a later polishing operation was necessary after heat-treatment. The new method takes hardened blank stock, loaded into a newer special machine, and grinds one flute complete. The machine automatically indexes and grinds the other flute. No polishing is required, and the operator is needed only to load, unload, and initiate the automatic cycle.



BEVEL GEARS

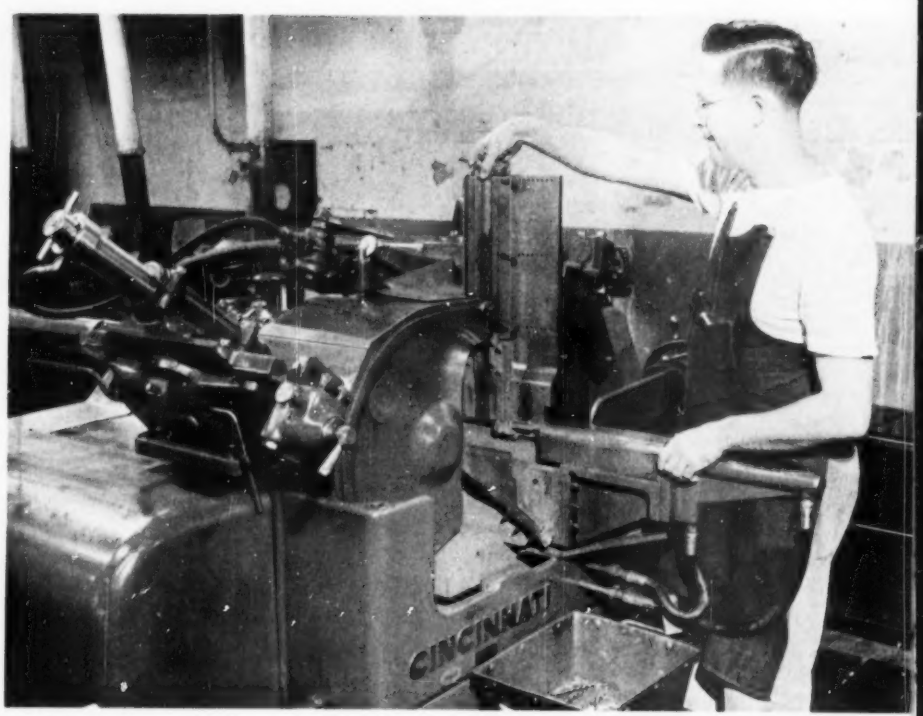
new-model Gleason machine cuts manual handling 70%

The differential pinion is a straight bevel gear, cut originally on a No. 6 Gleason Revacycle from solid metal. One operator handled two machines, chucking and dechucking at one machine while the other was operating. Control was by a single hydraulic lever. The new No. 8 machine, however, has an automatic chucking and dechucking mechanism, loaded from a fixture with a capacity of 57 gears. One operator can now handle five machines, keeping the arbors of gear blanks filled in sequence.

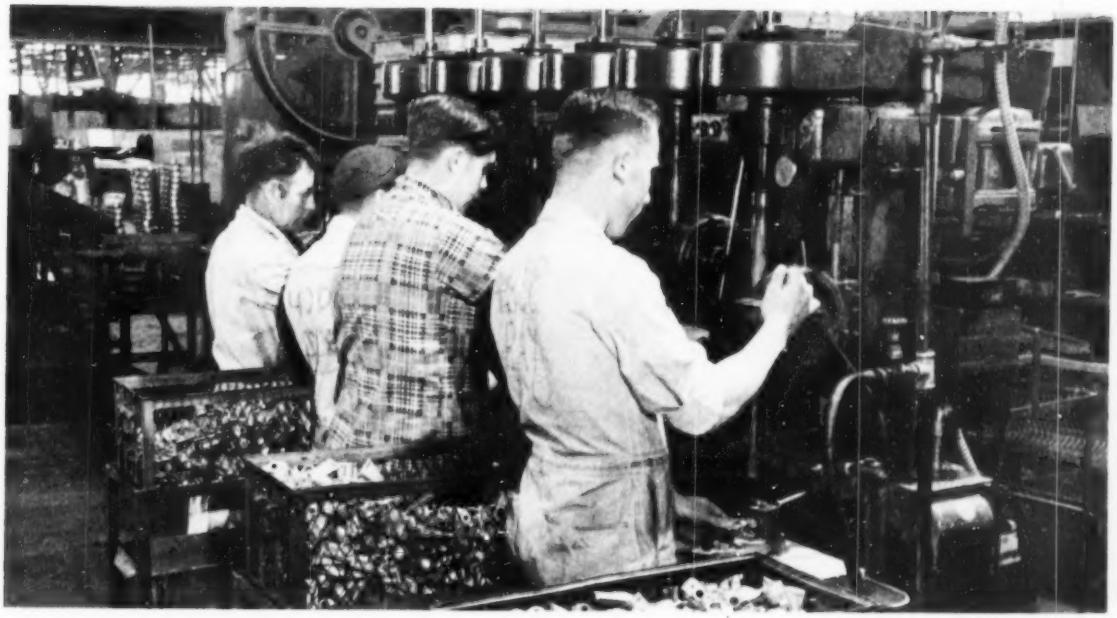


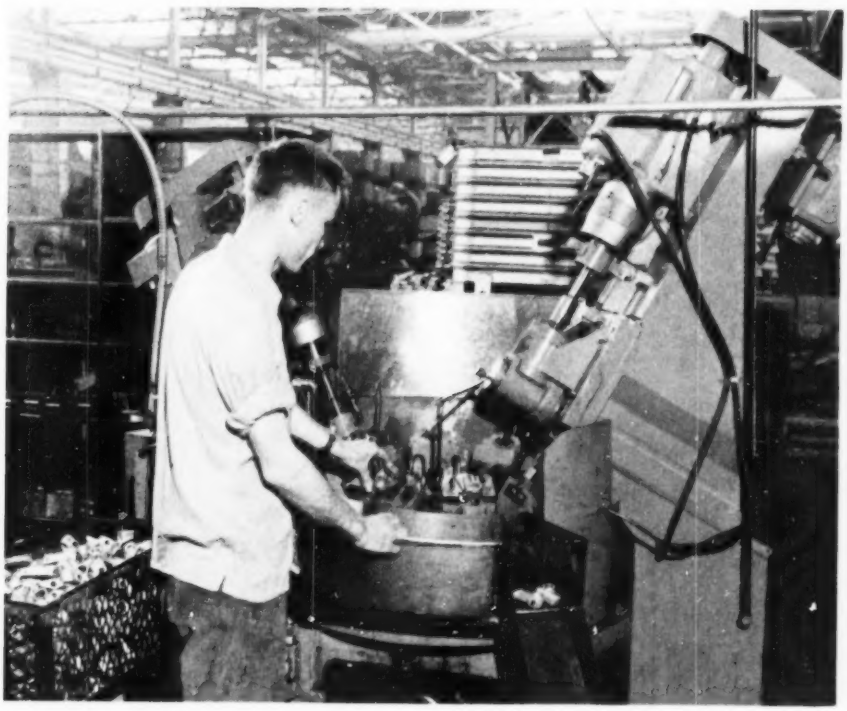
magazine feed boosts drill grinding

Partly finished drills were at one time ground to finish the OD in a centerless machine, being fed by hand. The regulating wheel had to be advanced and returned by the operator, making the whole operation non-automatic. Now, however, the work is done on another centerless grinder equipped with an automatic magazine feed. The regulating wheel is automatically moved and returned to rest position, and stock is automaticaly ejected after grinding. The new method also has improved safety features of the job a great deal.



multiple- station machine speeds drilling, reaming

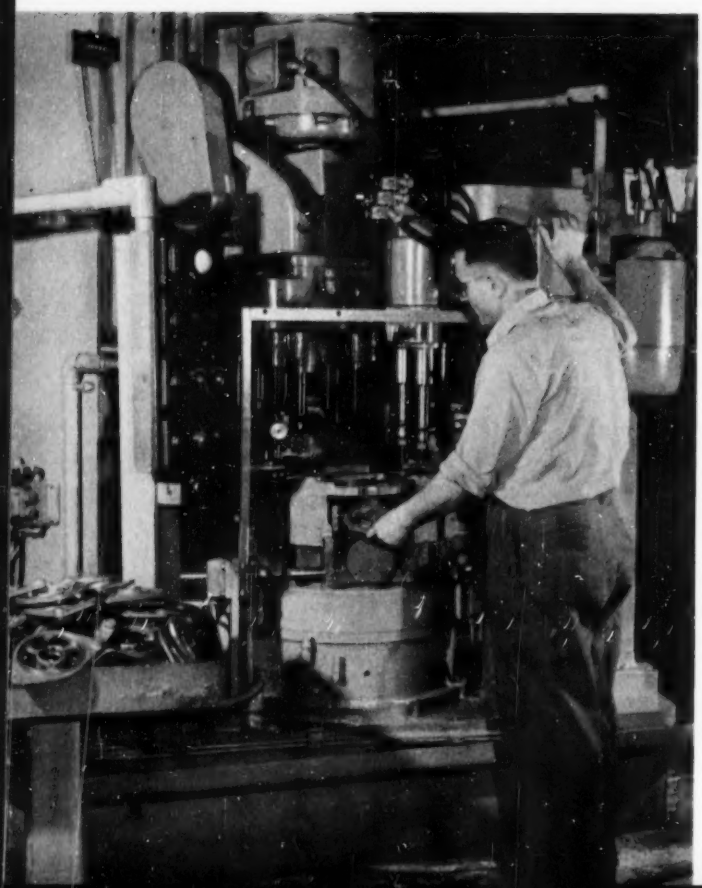




Four operators at a gang drill and another worker at a horizontal mill performed drilling, reaming, and cutting jobs on rocker-arm supports in fairly conventional operations. These same parts—for the new overhead-valve engine—are now being produced complete at one machine, controlled by one operator, at 750 pieces per man-hr instead of the old rate of 38. The machine is a special design with several stations, and operates automatically. An operator simply loads and unloads the work-carrying fixtures.

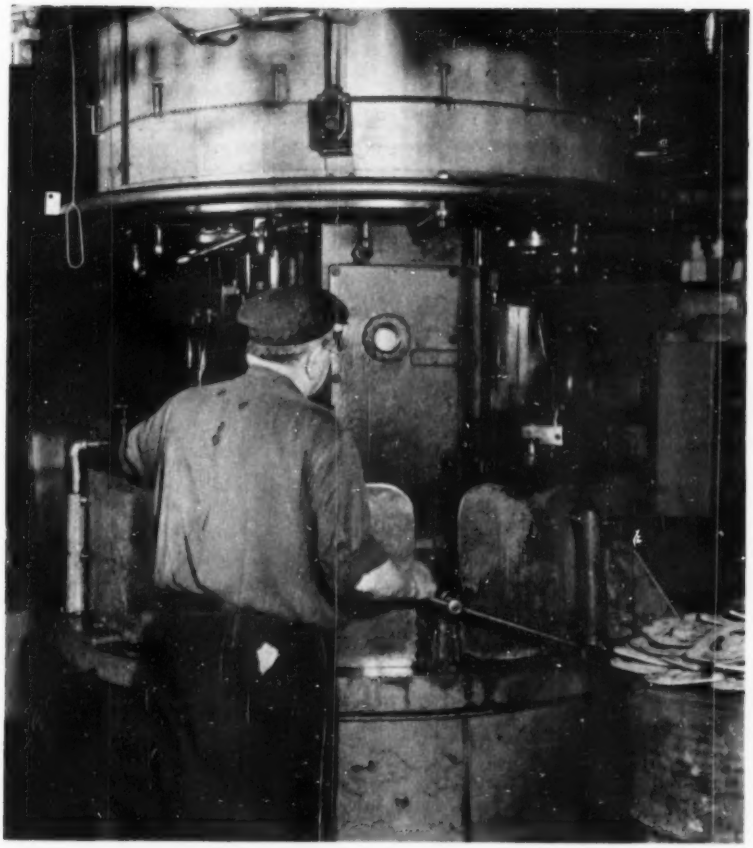
MACHINING

GENERATOR FRONT-END PLATES

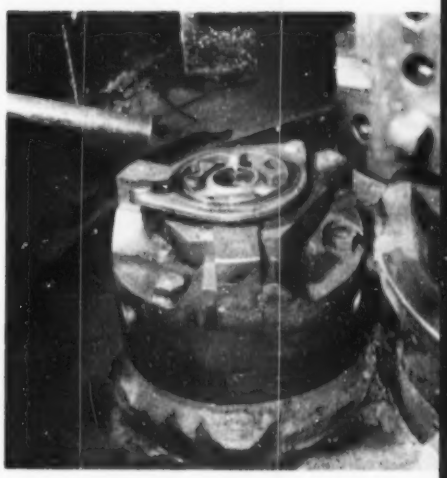


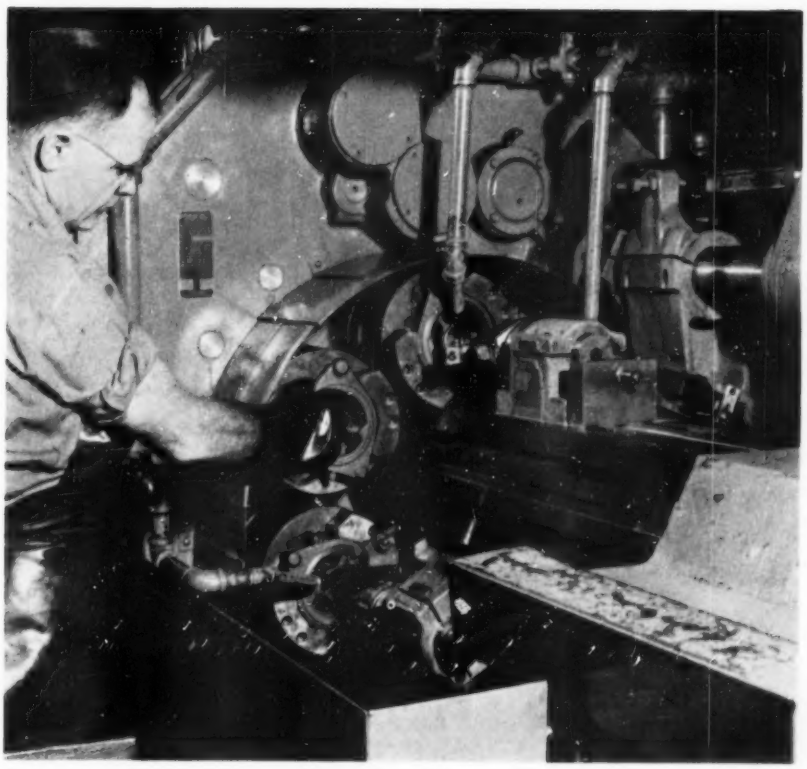
indexing machine improves speed and quality over seven drillpresses

Seven operations, including drilling, tapping, counterboring, and spotfacing, were handled at separate machines; and the plates had to be passed from one machine to the next. Handling was slow, and any stoppage at one machine held up the whole line. Recently, however, the work has been moved to a special indexing machine equipped with tools to do the same machining. Production is much higher, handling is simpler, housekeeping is easier, and quality of workmanship has gone up.



new chucker jumps production rate

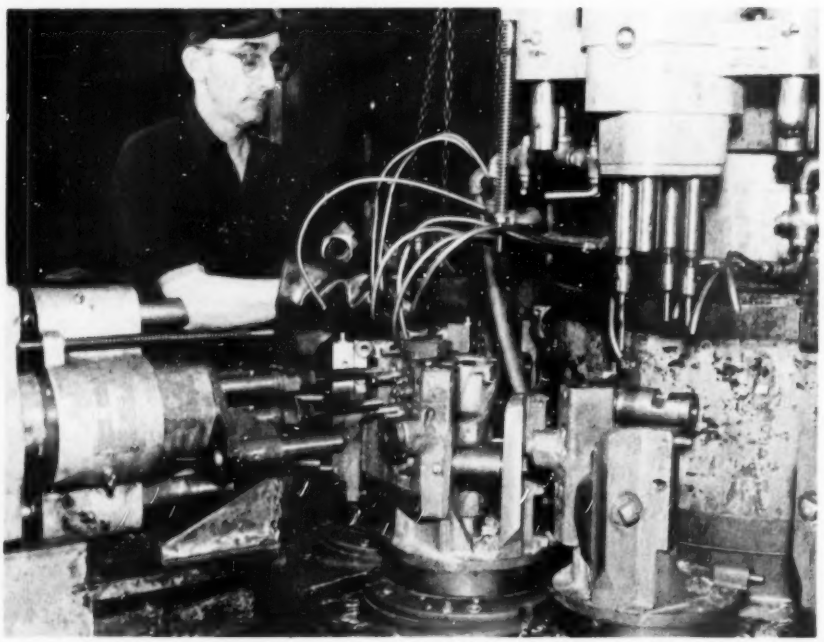




Machining on generator plates was formerly done on a six-spindle chucking machine, and is now handled on another six-spindle chucker. The difference in production rates is in the machines themselves. The older model, a vertical unit, did facing, boring, countersinking, and chamfering at 60 parts per hr; while the new model handles the same operations more accurately and much faster. The new horizontal machine demonstrates an increase in production due to advanced design.

one indexing machine replaces 13 drills

The old drill line followed standard practice, with the work progressing from one machine to the next, stored on tables between machines. Tool trouble and breakdowns stopped the whole line. The new indexing machine takes much less floor space, insures higher accuracy (because of better fixturing), and does the whole job at much less expense. Only manual effort is loading and unloading.



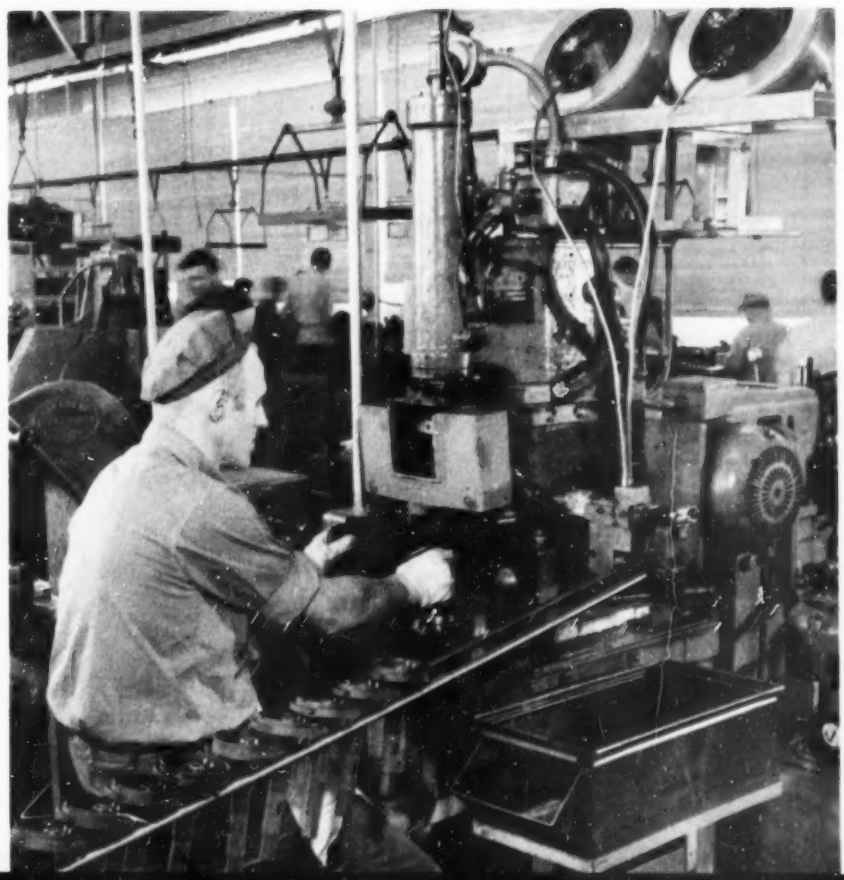
DISTRIBUTOR HOUSING

automatic feeders

double

assembly production

Posts for breaker-plate springs were assembled into distributor housings by two men; one inserting the posts in a fixture, and the other locating the housing and operating an arbor press. Parts at the press were handled in pans; production was low. A better setup includes two hopper feeds (for posts) that twist 180° to deliver the posts in position for driving; and an inclined rail chute that delivers the assemblies after the operator has removed them from the driving machine. The operator also loads housings into the machine, and produces more accurate work.

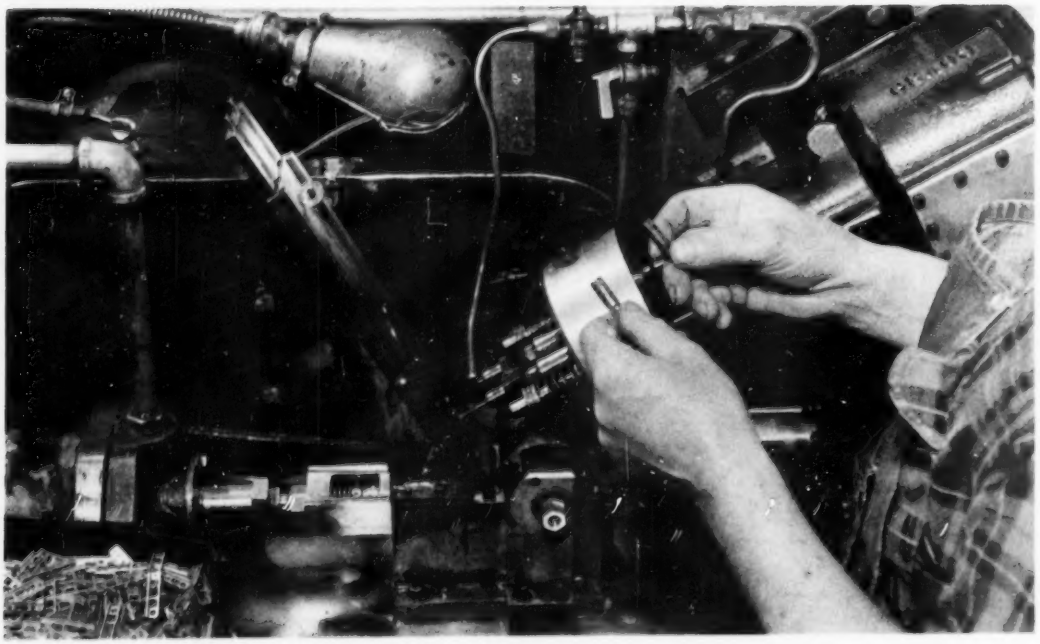


MACHINING

HEAT–INDICATOR FRAME

The electric heat indicator for an automobile instrument panel requires a frame, which must be sawed, crimped, and tapped. This work was done separately on a two-shift operation by six men using single-purpose equipment. The new equipment, built to Ford specifications, turns out two frames per cycle and with all machining complete. The operator has only to feed the machine. Improved quality of workmanship has almost eliminated rejections during final assembly of the meter.

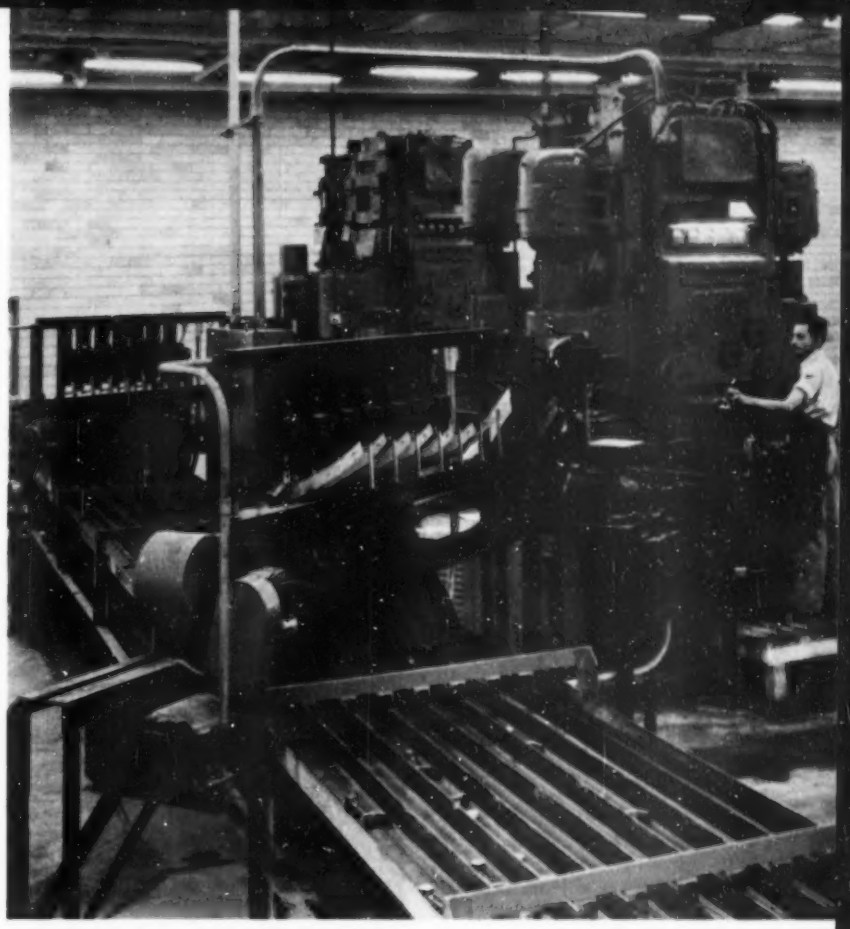
multi-tool machine reduces shift requirement



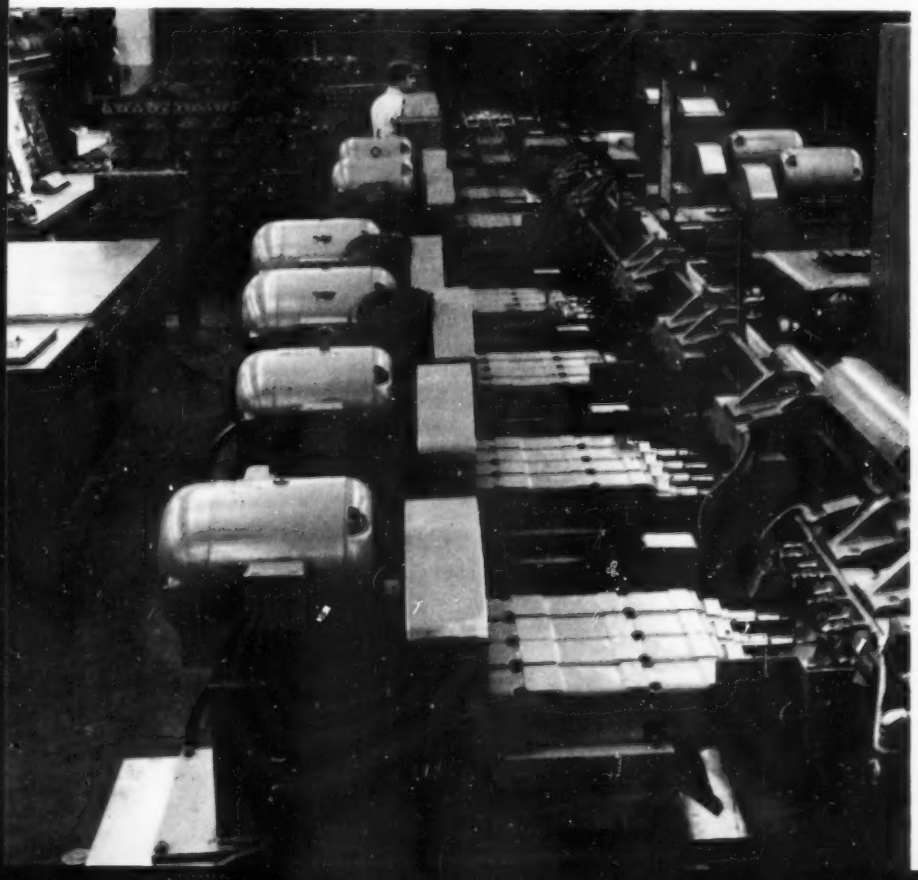
CONNECTING RODS

weighing sorter grades rods to determine broaching-cut depth

Out of the Hanchett grinder, where connecting rods are roughed and finished on both sides, the parts go through an automatic grading device that splits the output into eight categories, separated in 9.4-grom intervals. The following operation is broaching, where the final weight of pin and crank end is matched to a master weight by varying the amount of stock removed from the rod. For each category of rod size, therefore, the adjustable broaching fixture is set to produce the final weight.



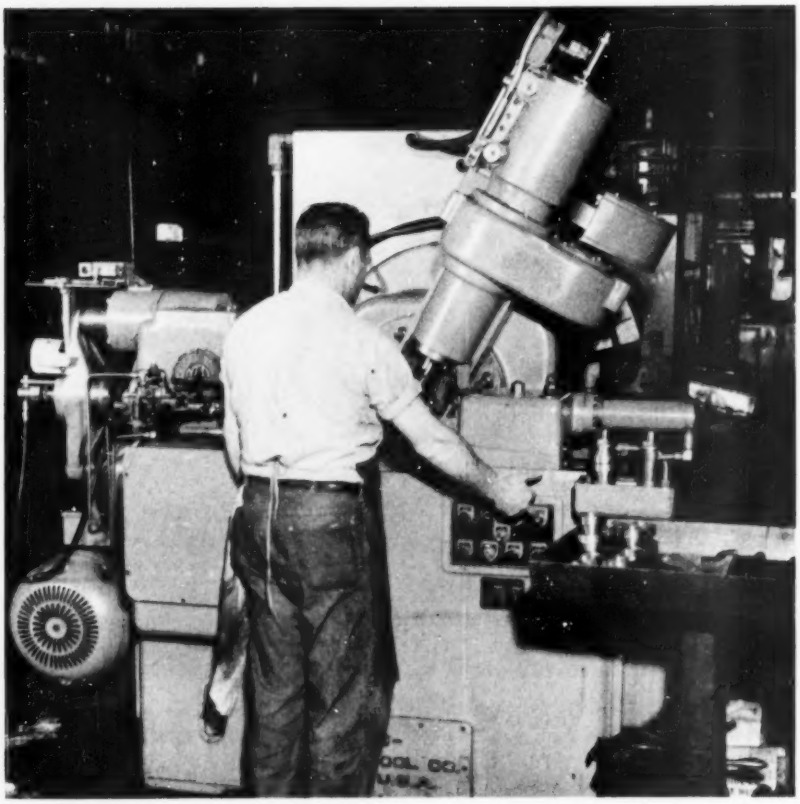
CYLINDER BLOCKS . . . ***12-station Heald inline machines Lincoln seats and holes***

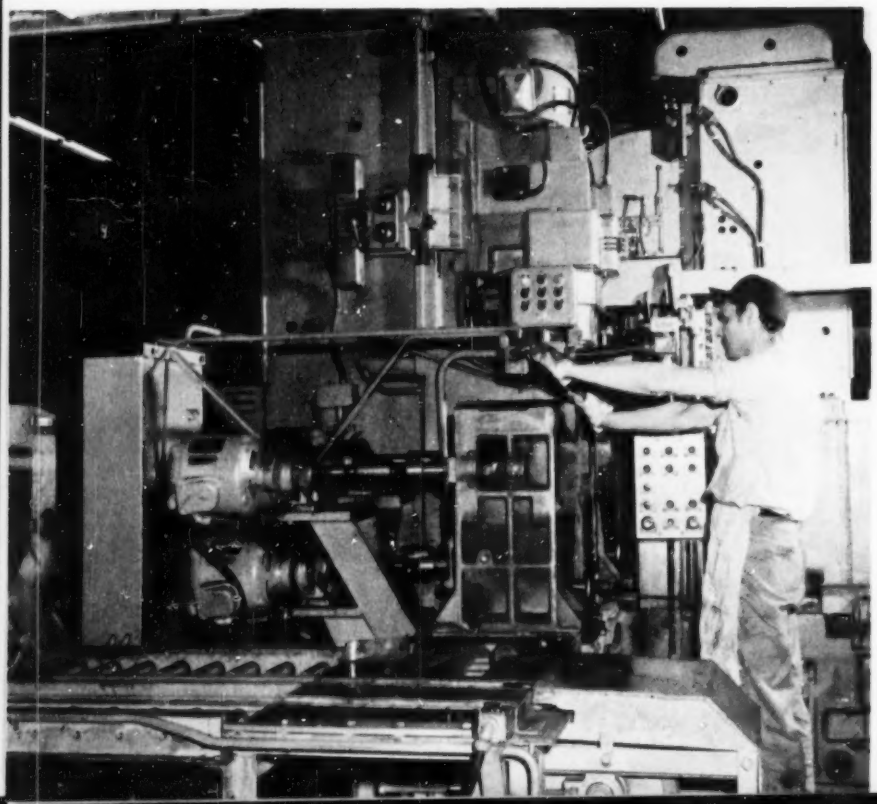


Blocks for Lincoln overhead-valve engines are placed in a loader, then are automatically turned and rotated so the valve-stem holes can be drilled, semi-reamed, fly-cut, and finish-reamed. Valve seats are generated from the stem holes. Production rate on this machine is 60 blocks per hr.

new gear hobber reduces maintenance costs

Eight-spindle and single-spindle hobbing machines produce transmission gears. Latest developments and improvements indicate that the single-spindle machine has the capacity to produce 50% as many gears as the eight-spindle machine. Therefore, two high-speed single spindles can produce as much as a single eight-spindle machine, with a proportionate reduction in manpower requirements. In addition, loss of production due to machine downtime is less with the single-spindle machines.

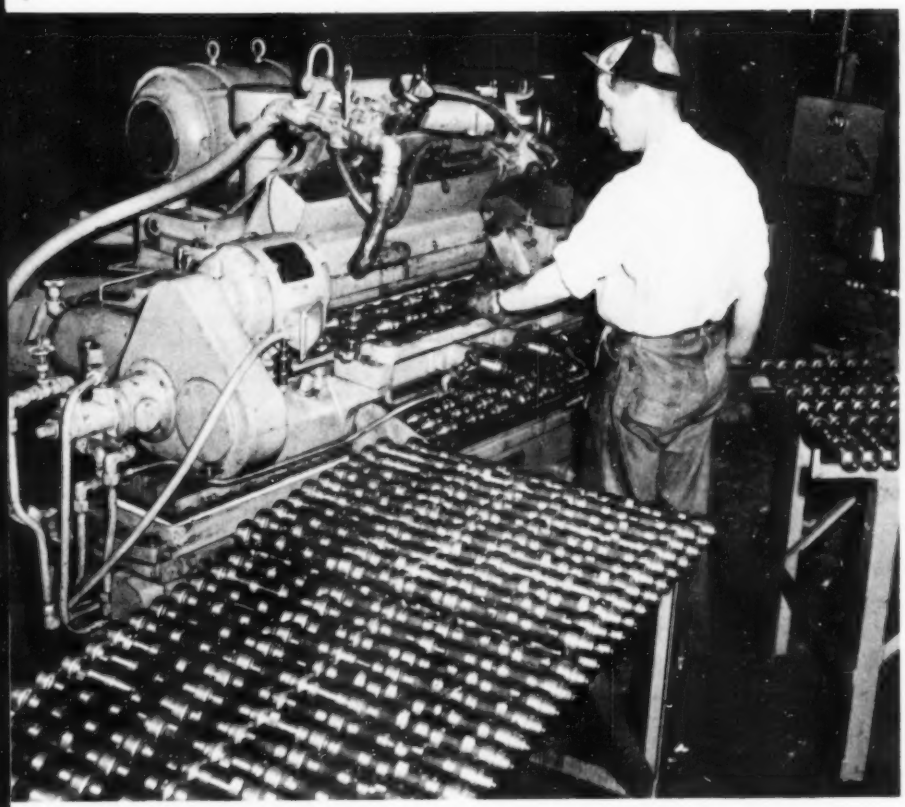




FLYWHEEL HOUSINGS

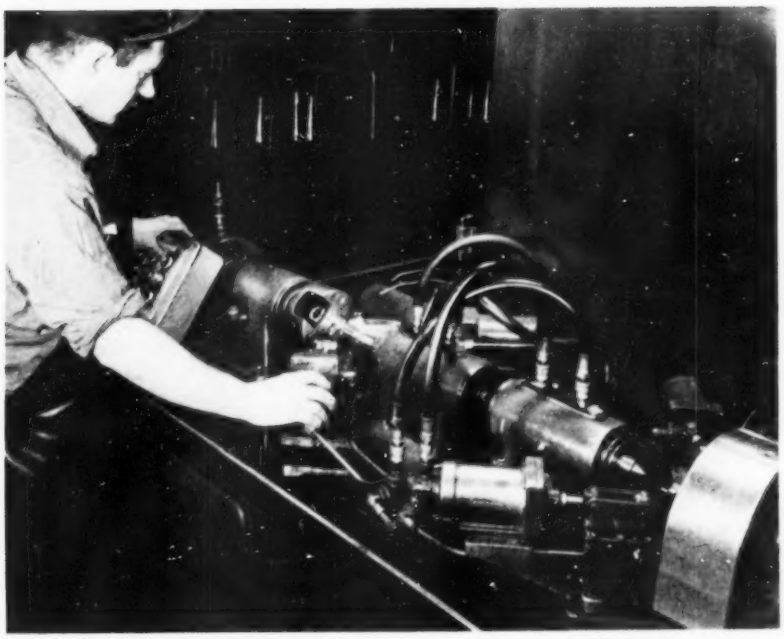
transfer machine cuts costs on 50 operations

There are 10 stations and 15 fixtures on this transfer machine made by Baush; it drills 15 holes, reams 9, countersinks 12, taps 13, and spotfaces a pad by using only two operators for loading and unloading. Cushman power wrenches are utilized for setting and releasing cam clamps that hold the housings in place. This equipment replaces the old setup where multi-spindle drilling machines were handled by five operators to do the same work.



17-wheel grinder semi-finishes 150 shafts per hour

Casting flash is removed, the body dia is trued, and the cam lobs and main-bearing side walls are cleaned up in a special Landis grinder that cycles automatically after the operator has positioned the work in trunnion supports. All clearance surfaces are plunge-ground while a hydraulic mechanism controls the feed. Semi-finishing on body and clearance areas is complete after this operation.



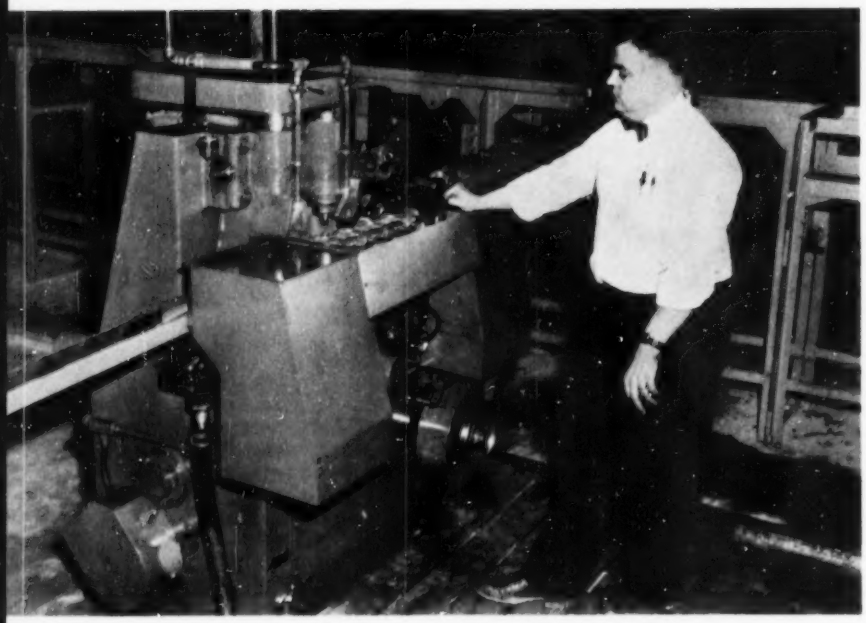
FRONT-WHEEL SPINDLE

lowered hardness allows rolling radius fillet

Exhaustive tests on the critical front-wheel spindle have proven the fillet close to the inboard bearing is the most critical spot on the spindle. Best results in fatigue life and machinability have been obtained by acquiring four two-spindle double-end rolling machines that replace older grinders. Now the fillet is rolled instead of ground, providing better life and easier machining.

MACHINING

PISTONS



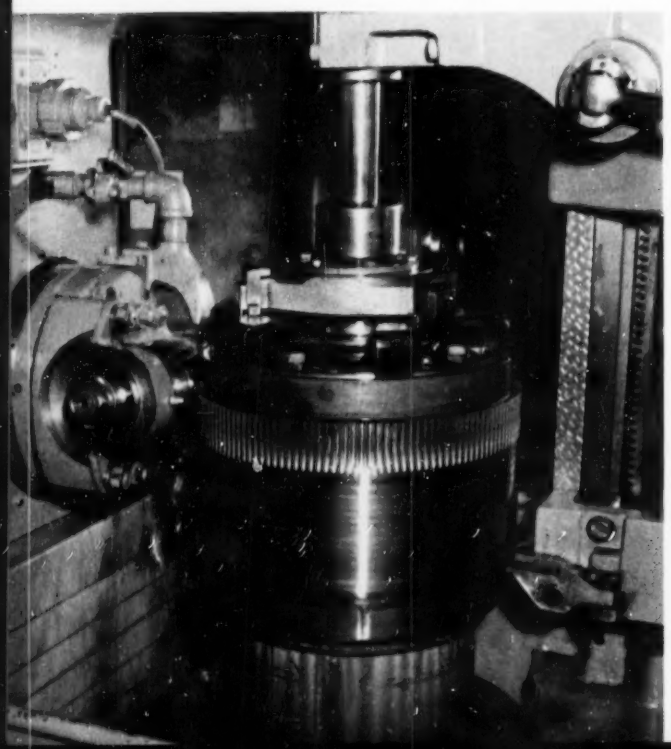
magazine and chute feeds raise miller output

Manual positioning has been replaced at a Baird 4-station vertical miller by an automatic rake feeding a magazine from the conveyor belt, and by automatic-ejection features on the new-model miller. Machining operations are the same; a retainer groove and chamfer are cut on one side, and the part is rotated 180° and the operation repeated. Main difference between the old and new machine is that the part is automatically gaged, located, and rotated.

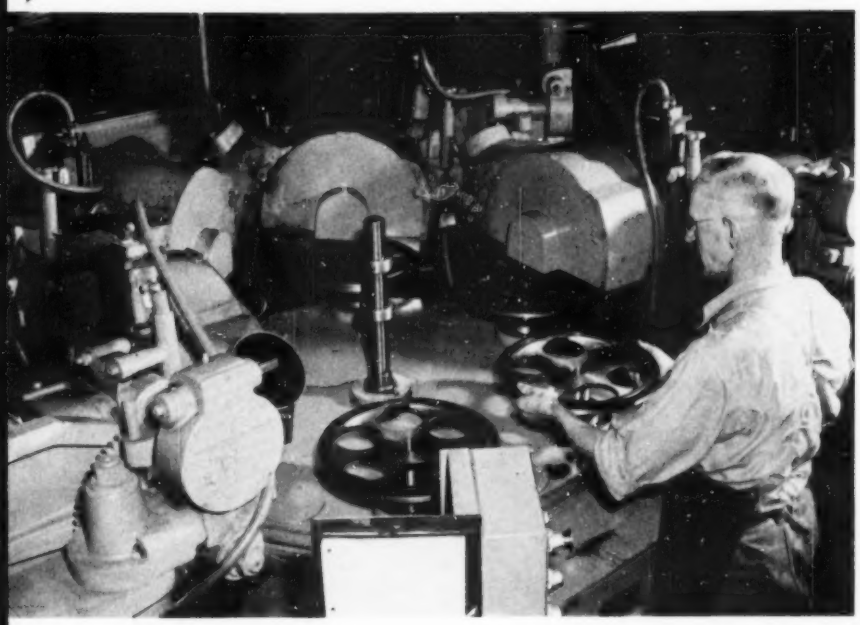
FLYWHEEL RING GEARS

floating expanding arbor grips gears for hobbing job

Twenty ring gears are located on this special expanding arbor for hobbing the teeth in the otherwise-finished blanks. A master drive shaft moves friction plates, gears, and eccentric cams to expand the locating rings that actually clamp the workpieces by their ID's. Normal variations in inside dimensions of the work are compensated for by float in each ring. Positive locking is therefore assured, and accuracy of the operation is high, even though the work load is large.



FLYWHEEL RING GEARS



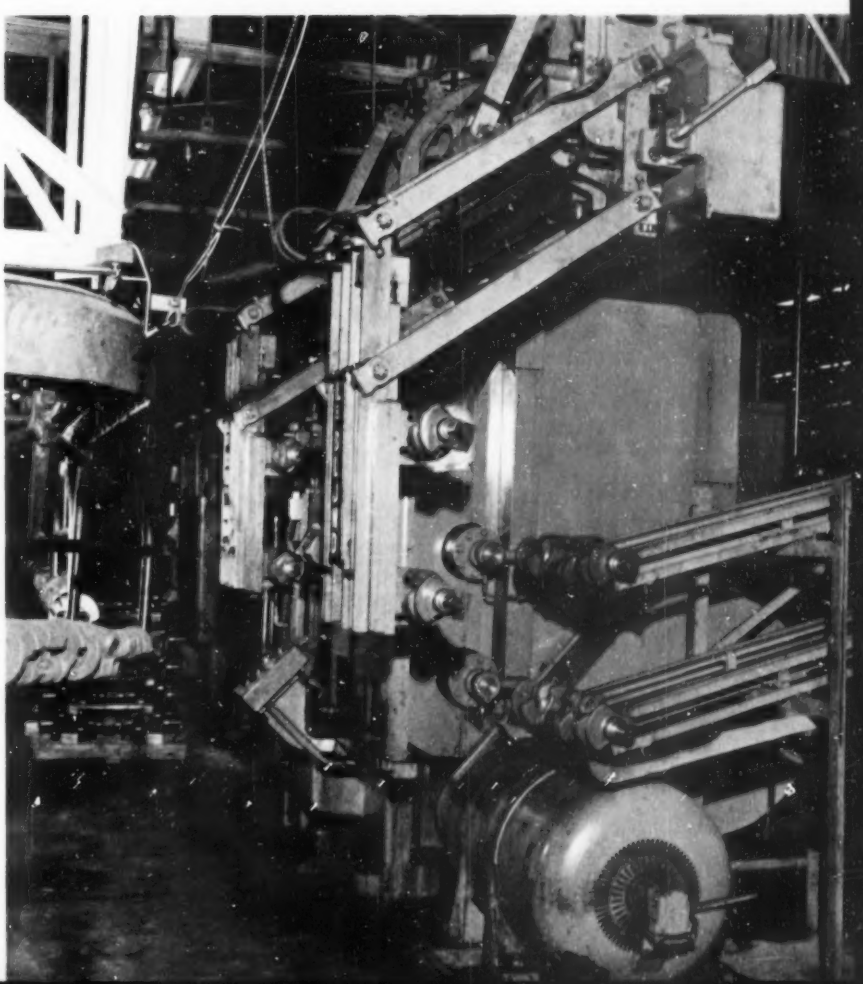
automatic wire brushing deburrs gears to uniform finish

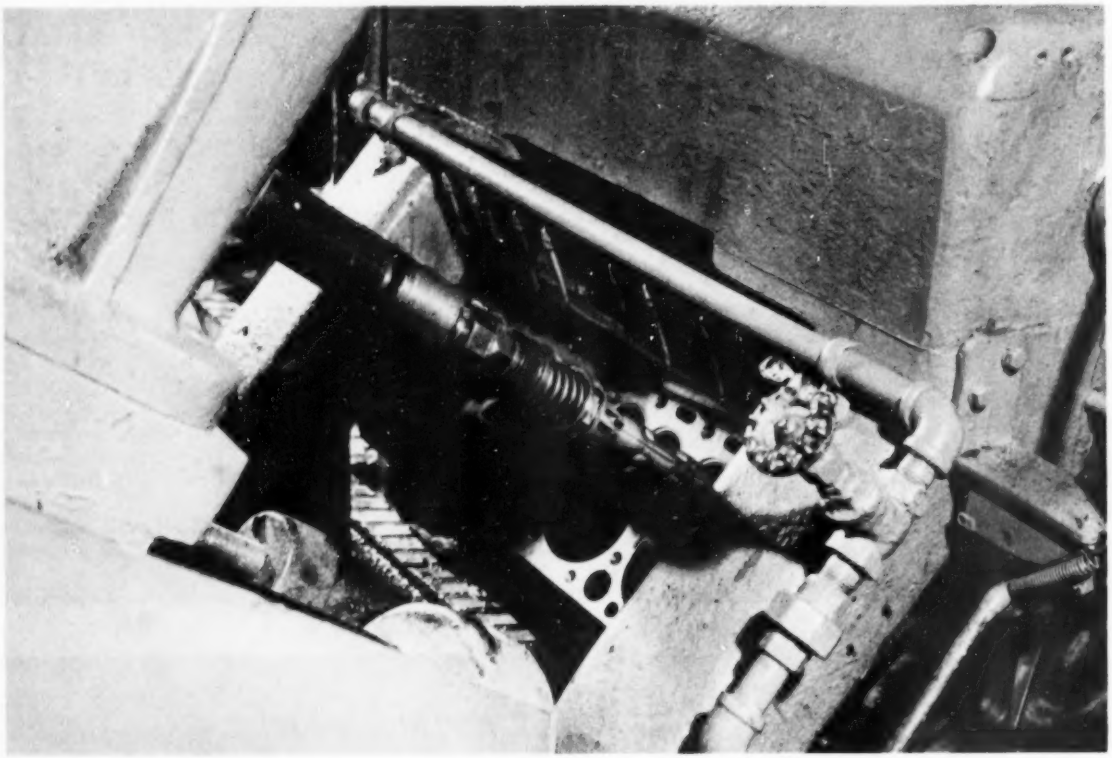
Considerable savings in time, labor, and effort over older hand or semi-automatic methods of finishing ring gears have been realized with an automatic Acme machine that carries six slow-rotating gear holders around a rotating table under four wire-brush heads. This cleans off burrs left from the hobbing operation, and leaves no hand work to do. Production is 316 parts per hr. The automatic cycle includes stopping each gear holder at the loading station so the operator can insert a new part easily.

CRANKSHAFTS

traversing device loads and unloads at 48 pcs per hour

LeBlond automatic lathes—two-spindle duplex machines—rough and finish six pin bearings on each crankshaft, two parts per cycle. Handling to, from, and in the machines is automatic. A cradle turning fixture in the lathe is fed new crankshafts by the right-hand loading arms, which pick up parts from the end of the rack (right foreground). As this goes on, the left-hand loading arms pick finished parts from the lathe and deposit them on rails that feed to the next machine. Turning is done on centers, with milled notches on the shafts being used to position them during machining; which is done from a master tracing cam.



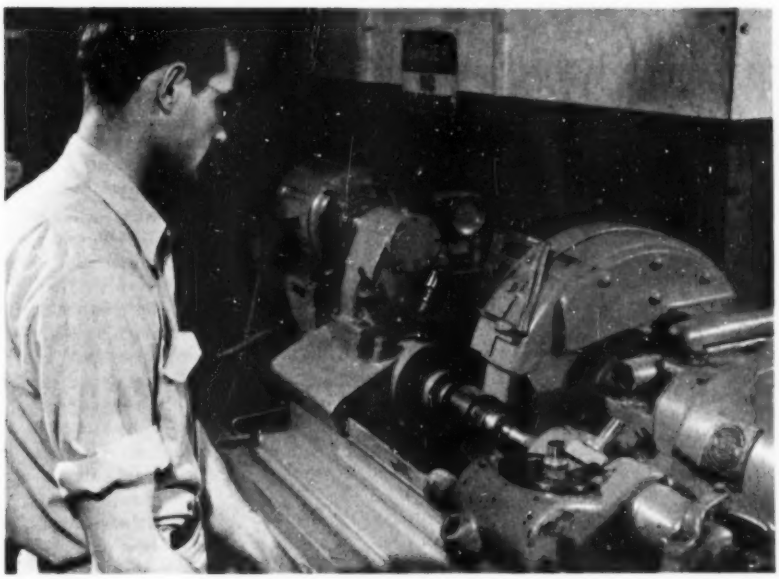


special cutter produces high finish to eliminate grinding

Accuracy required on valve seats demanded grinding in addition to milling to produce a good finish and high accuracy of the final shape. But the old milling cutter has now been replaced by a new one with a longer pilot bar, giving more bearing surface in the pushrod hole. Carbide bits are now used instead of chromed integral teeth, and spring-loading has been added to even out the cutting load. Now the valve seats are finished on a special Excello machine in one operation (after the usual roughing).

ARMATURES

six-spindle chuckers take over OD machining



Generator and starter armatures were finished in two operations; one cylindrical-grinding the OD's, the other cutting the commutators on a six-spindle chucker in a separate operation. But it turned out to be possible to combine the jobs on the chucker, eliminating the grinder requirement. The old chucker tooling was rearranged, and an auxiliary slide, toolholder, feed mechanism, and tooling were added. Now both jobs are done at the same setup, which cuts out time for grinding and time for transferring the work to the other machine.

POWER TAKE-OFF SHAFTS

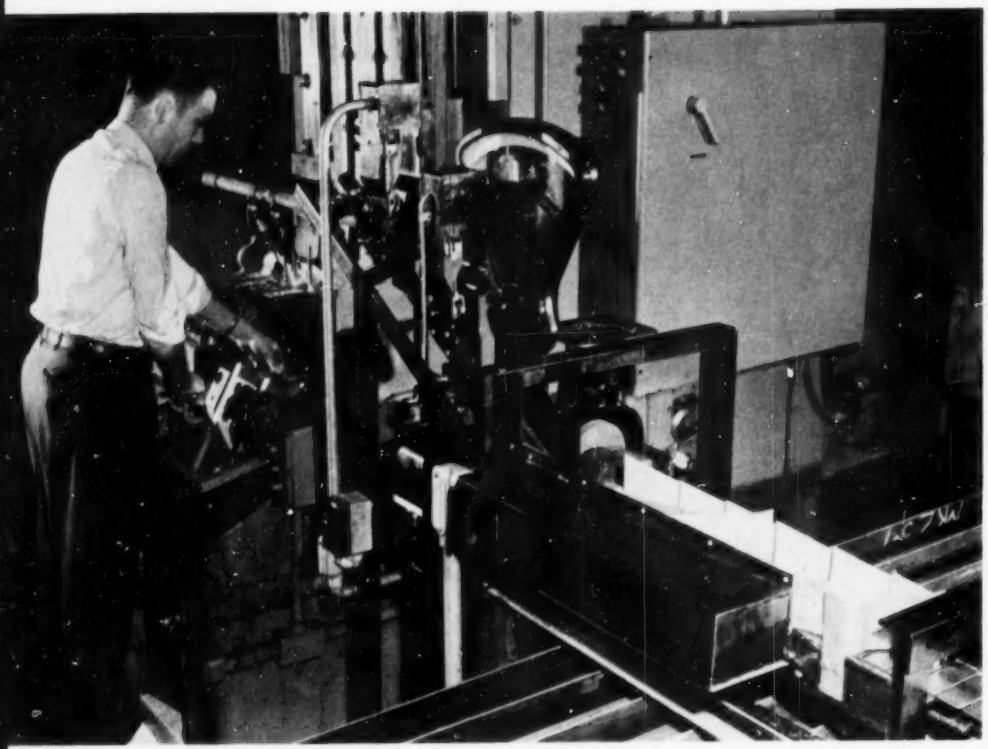
double stock feeding reduces four setups

Tractor shafts were made previously by cutting stock to length in a turret lathe, centering and chamfering on an engine lathe, straightening on a press, and turning the OD on another engine lathe. An unusual method of feeding stock out to twice normal length on a Conomatic 6-spindle bar machine allowed doing all these operations at a single setup. Resulting savings in time were about two minutes per shaft, and a great simplification of the work resulted.

MACHINING

CONNECTING-ROD CAPS

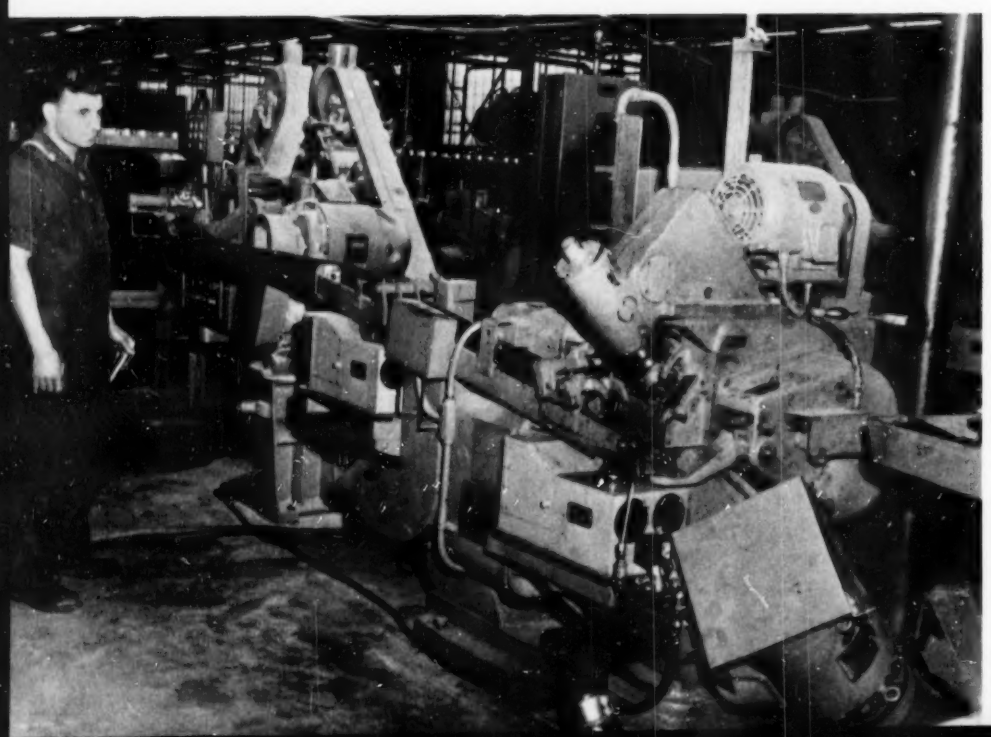
weigh-sorting rhythmizer prevents choking at sorting scale



A new setup considered the best possible in the industry today includes a broach that roughs and semi-finishes the widths of rod caps by centralizing them automatically before the cut is made. The parts are then removed and placed in a rhythmizer that leads to the weigh-sorting machine. This equipment feeds caps to the weighing machine without allowing jams. Caps are sorted into six classifications automatically and are deposited onto a divided conveyor.

PISTONS

weighing miller cuts pistons to ±2-gram accuracy



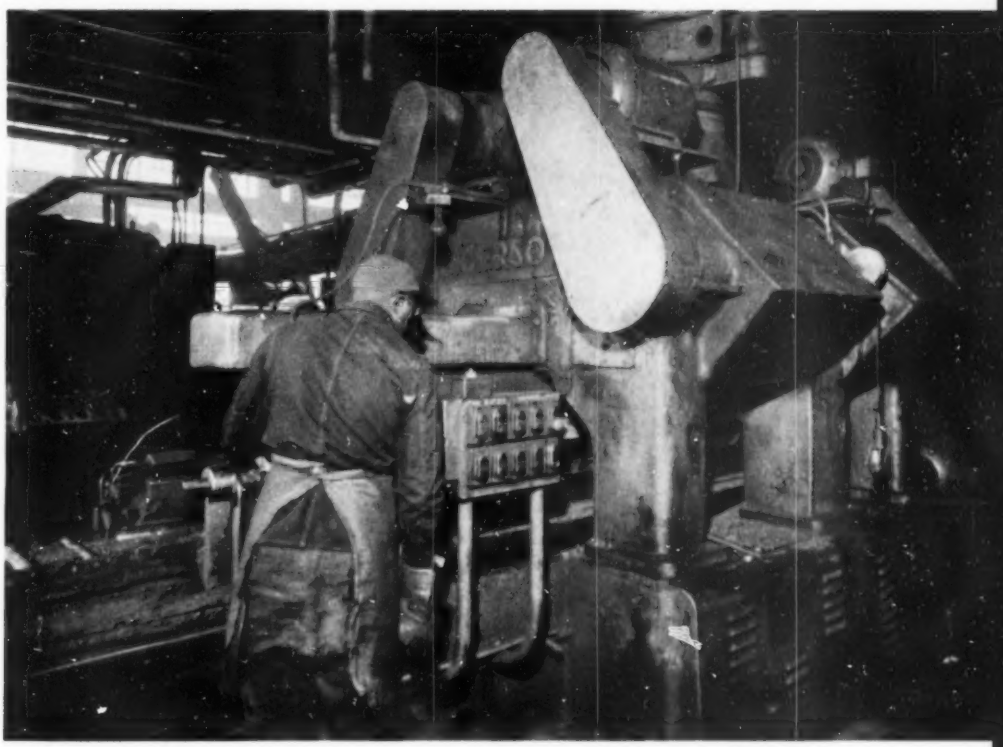
To replace an old method involving manual weighing, balancing each piston on a drill-press, and removing stock from lugs inside the ID, this automatic weighing and sorting machine has been installed. It is self-adjusting, and mills off the proper amount of stock without attention.

American Machinist

V-8 BLOCKS

combined machining done on one unit

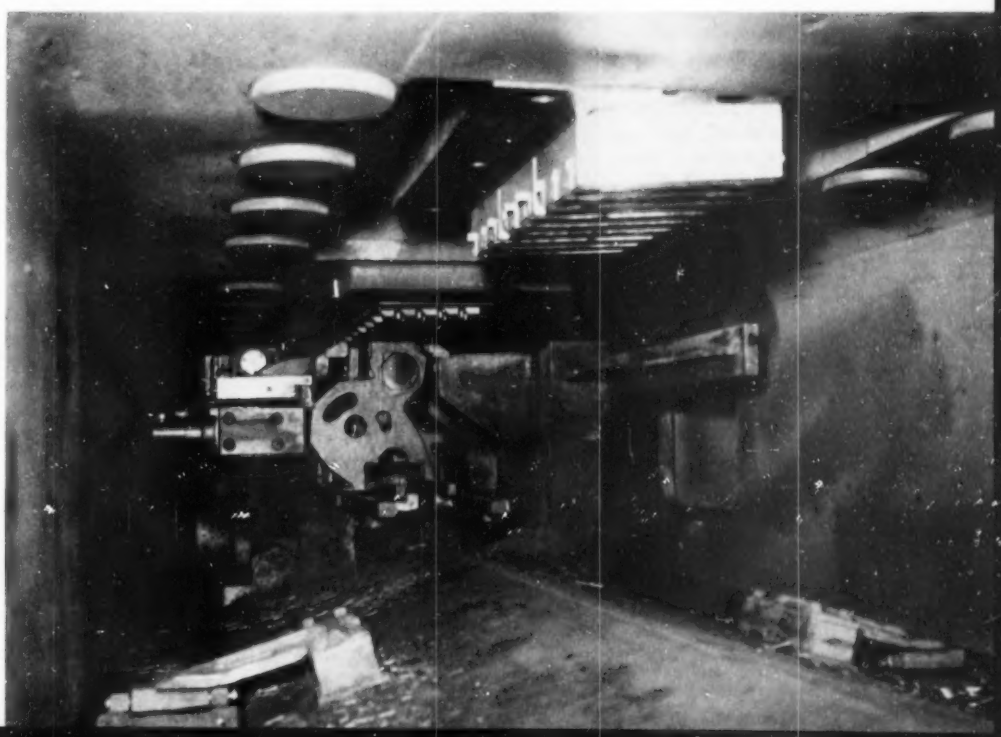
A single operator controls machining the ends and banks of 8-cylinder blocks at this Ingersoll straight inline equipment. It combines a number of otherwise separate milling operations into a single machine and a continuous cycle with the work being handled and conveyed automatically.

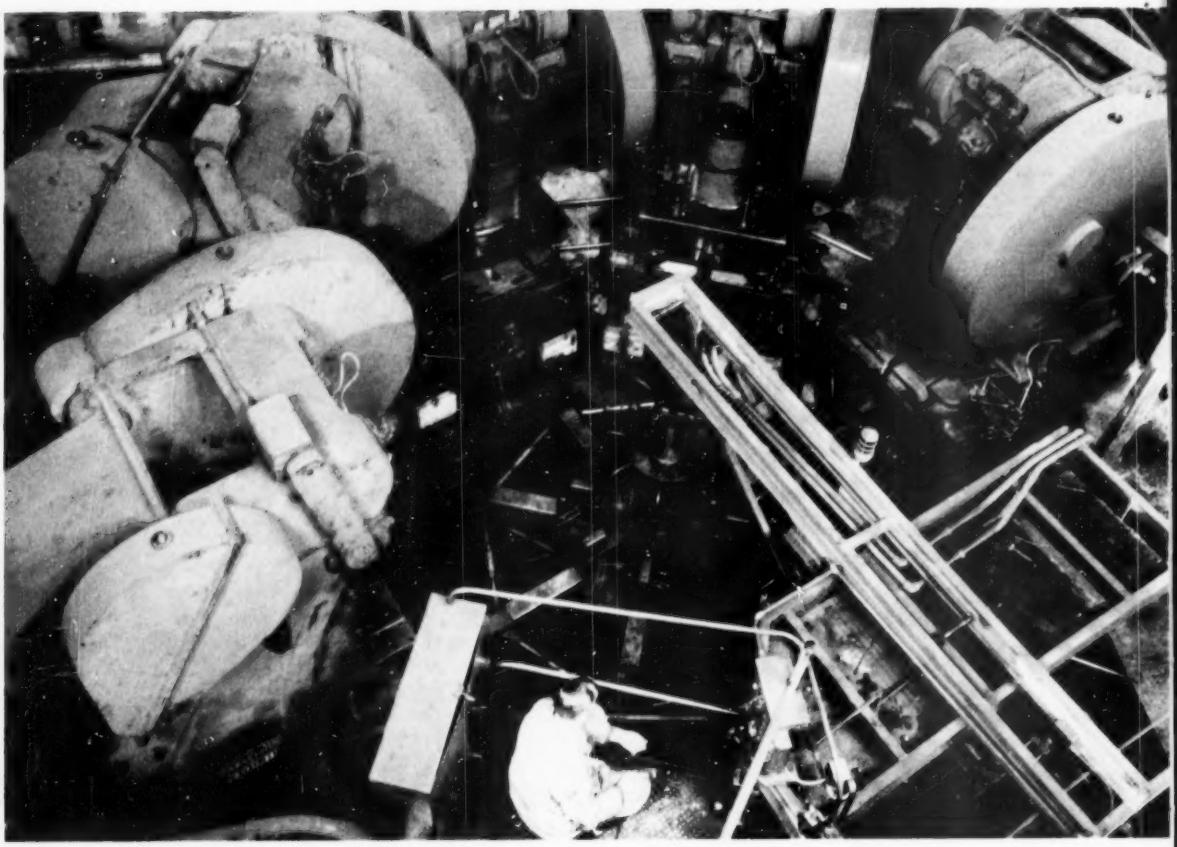


6-CYLINDER BLOCKS

tunnel broach finishes sides and top in one machining pass

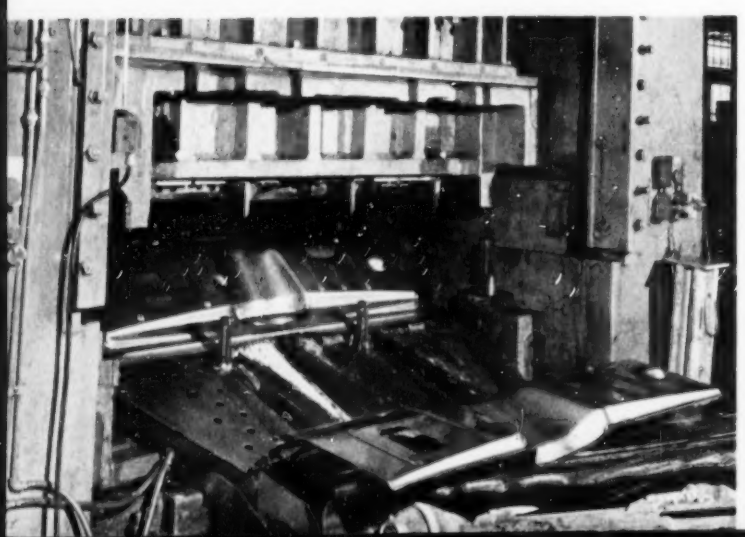
This unusual photo shows the travelling fixture carrying a 6-cylinder block past broaching stations inside a continuous inline machine. The tunnel machine cuts major outside faces of the block to accuracy that eliminates the need for later finishing. Broach cutters seen are for roughing and finishing top face of block where gasket is later assembled.





five automated presses lift production

A circle of punch presses in Ford's Mound Road plant exemplifies automation. The five machines are fed in turn by a spider merry-go-round that holds the parts even during the press strokes. Split axle-housing tubes are loaded into the spider arms at a station located at lower right. Banjo-face contours are formed in each piece successively, and the work is automatically ejected to move on to the next series of operations. One man operates the whole rig, which replaces a conventional press line where one man operated each press. One important feature is elimination of hazard.

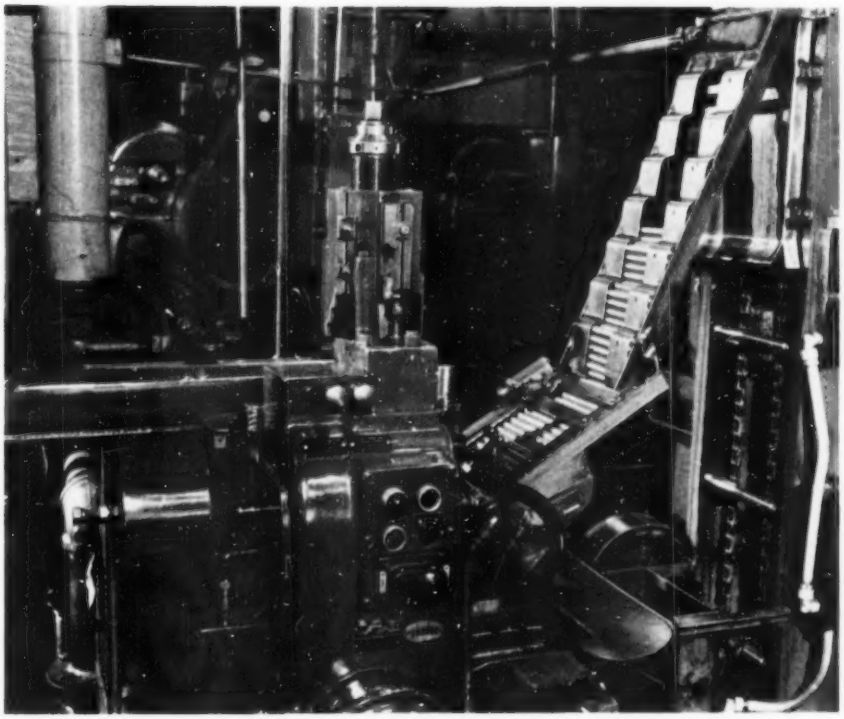


DASH PANELS

trim-press stops permit unloading without attention

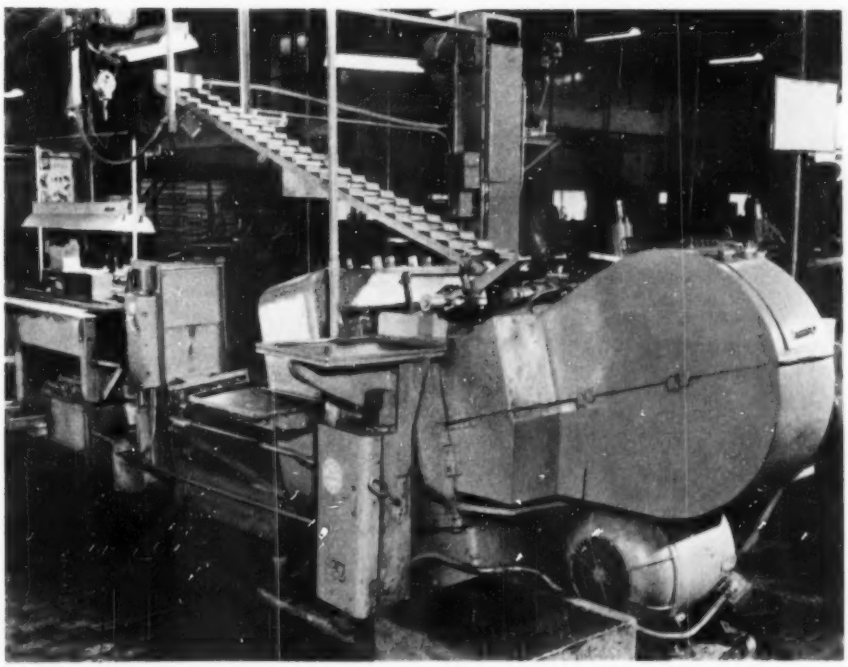
One of the simplest forms of automation is this set of retractable work stops located within the press. Each panel is loaded into the press, and is stopped by the extended arms. After press downstroke, the stops retract and allow the panel to slide down the ramp onto the end of a belt conveyor, at right, which carries the panel to the next machine. After the panel passes, the stops extend once more to catch the next part being stamped. The mechanism automatically unloads the panel.

saw-tooth magazine feeds keyway miller



No matter how automatic a machine may be, ultimate automatization must include automatic feeding and ejection to the next operation. On this miller that slots generator shafts, old practice was to have an operator load a chute at the machine from a tote box. Parts were ejected into another tote box, then carried to the next machine. Now shafts are delivered to the machine by tube, dropped into a saw-tooth magazine, and fed automatically. Ejected parts are carried by an elevator to the next operation.

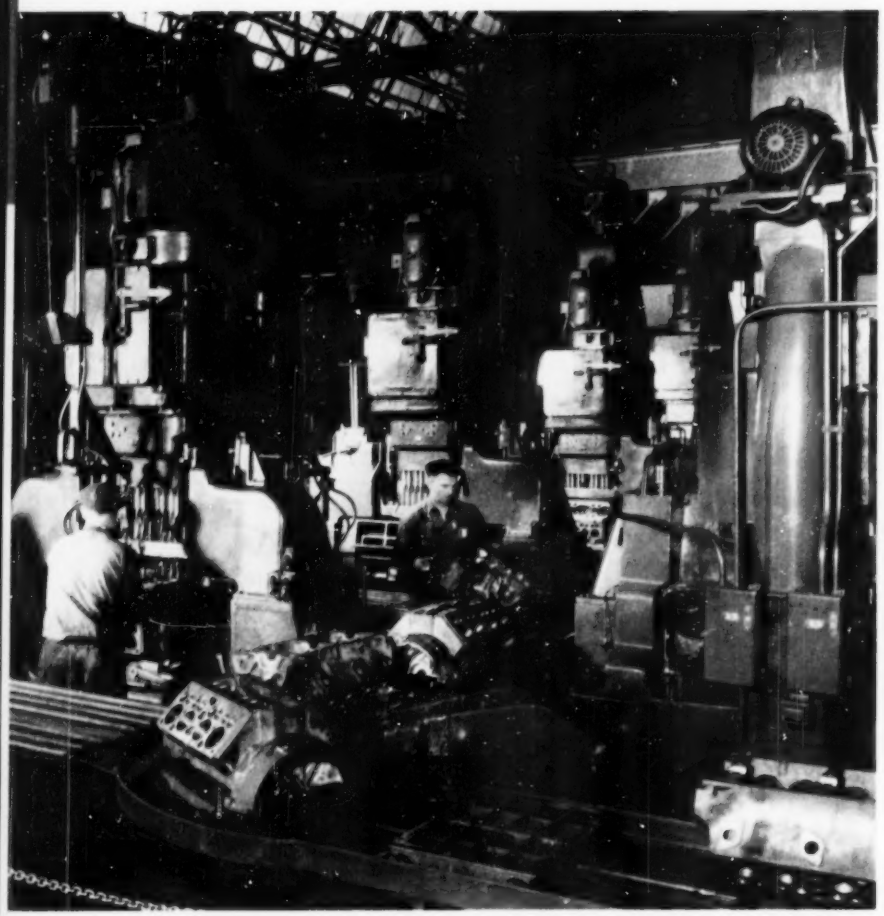
magazine switch starts thread-rolling machine on demand



Another saw-tooth-magazine feed operates at a standard thread-rolling machine where longitudinal serrations are rolled onto the shafts. Manual operations were handled by two operators here, but new loading and unloading devices, including one that removes the shafts from the machine and carries them to an inspection table, have been installed to eliminate a hazard to personnel. Many such mechanizations have been made in the Ford shaft-producing area, resulting in substantial savings.

AUTOMATION

V-8 BLOCKS



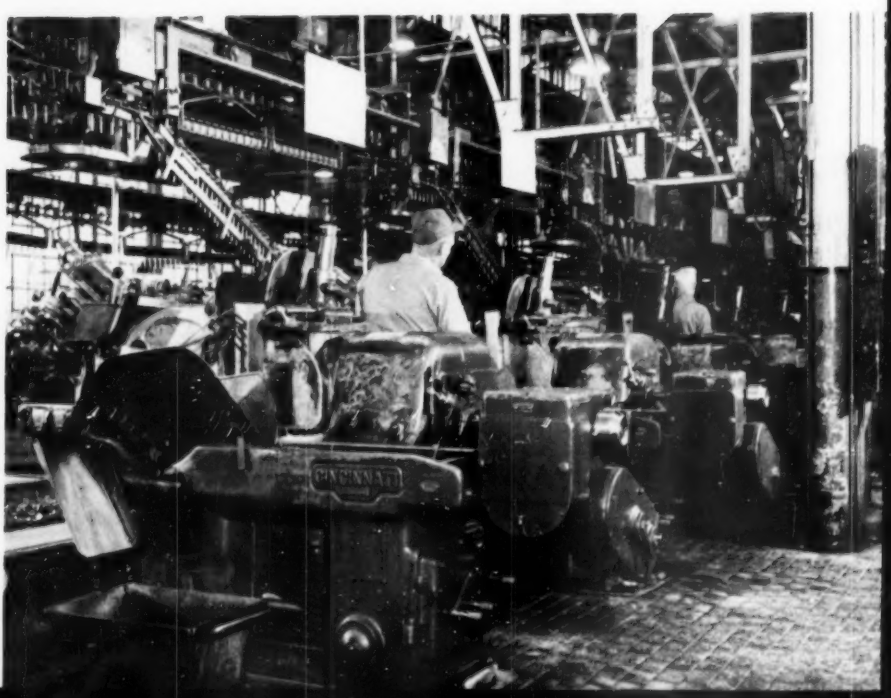
why automation was necessary

For contrast with present-day operations, here is a section of an engine-block machining area as installed ten years ago. Blocks ran along a constant-motion buggy conveyor, and operators picked off blocks as they needed them with the aid of an air hoist. Some manual jockeying was required to get the block close to the hoist. When machining was done, the operator would have to get the block from his equipment back to the conveyor, providing there was an empty buggy available. Occasionally a block would ride around on its buggy for some time before any operations were done on it.

EXHAUST VALVES

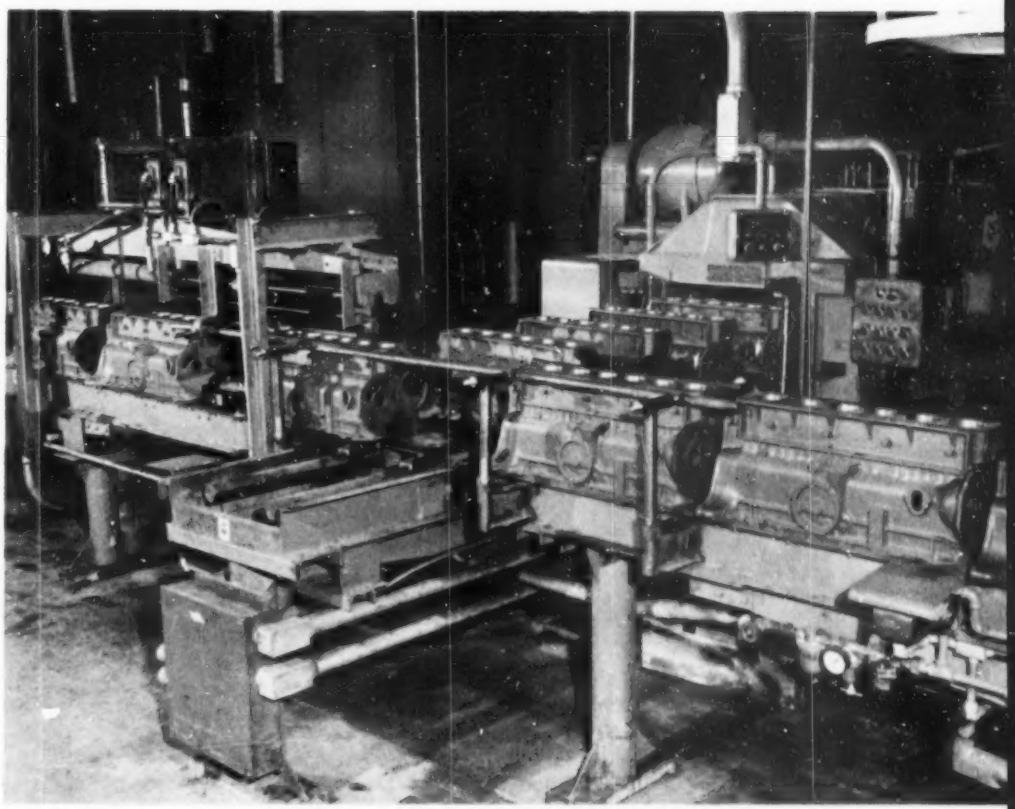
grinder automation jumps output

Originally this grinder setup was based on an overhead conveyor, which carried valves past all operations. Each operator picked a valve from the conveyor as needed, inserted it in a slotted holding fixture attached to the machine, and removed the valve after grinding to place it in a stock basket. With a similar overhead conveyor still in use, electric pickoffs feed valves down an inclined track directly to the grinding fixture. Ejection is also automatic.



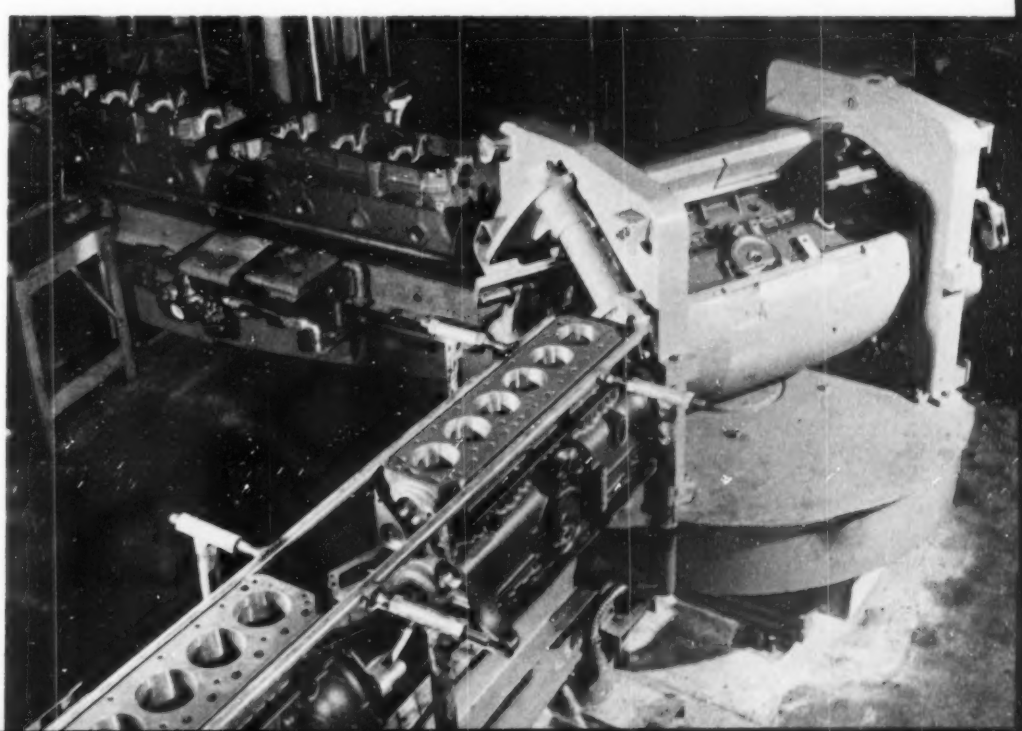
key-station control forces flow to operable machines

Two Sundstrand millers are fed from a single line (left in photo) through a key station that keeps the miller out of picture (right) always loaded, and pushes overflow to the miller at rear only when necessary. Electric interlocks and panelboards keep blocks from jamming the key station so only one block can be there at one time. If there is spare conveyor space leading to the right, the block is sent that way. Thus, if either machine jams or is inoperable for a while, the other will take the load. If both work and if too many blocks come along, the machine in the rear takes up slack.



compound turner rotates blocks

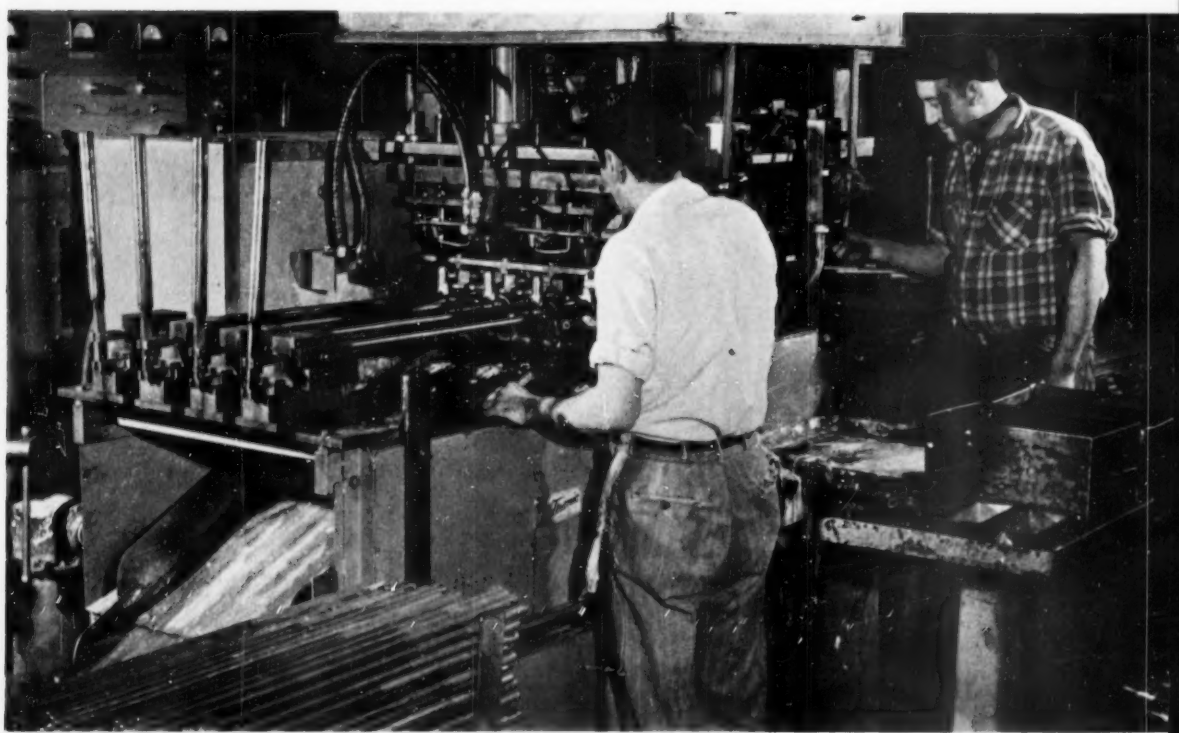
Block turning ten years ago had to be done by an operator on a section of roller conveyor poorly fitted for the job. The operation was very fatiguing, and it often resulted in damaged blocks. Now a form of automation handles this chore — at a right-angle bend in the conveyor line. Controlled by interlock switches and safety devices, the rollover device accepts a block, then rolls it 180° while rotating 90° itself. In the new position, it ejects the block onto the second conveyor leg, then switches back for a new block.



GEARSHIFT LEVERS

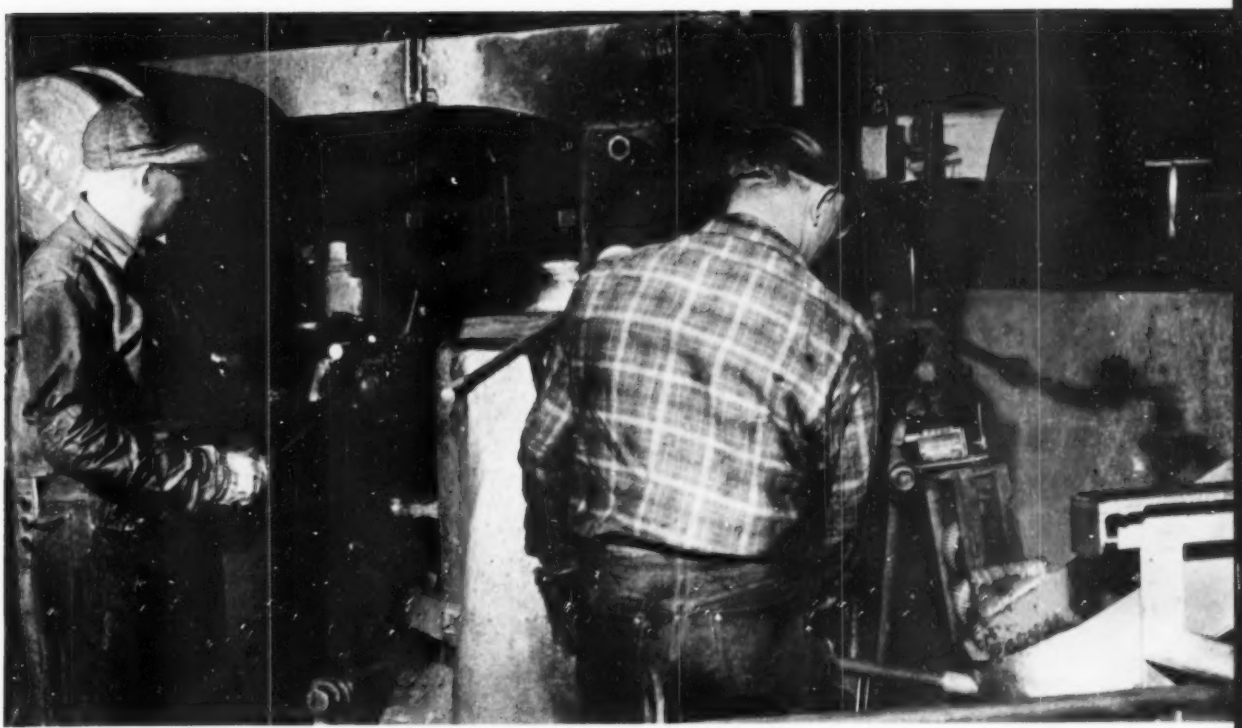
induction welding four levers at once beats butt welding

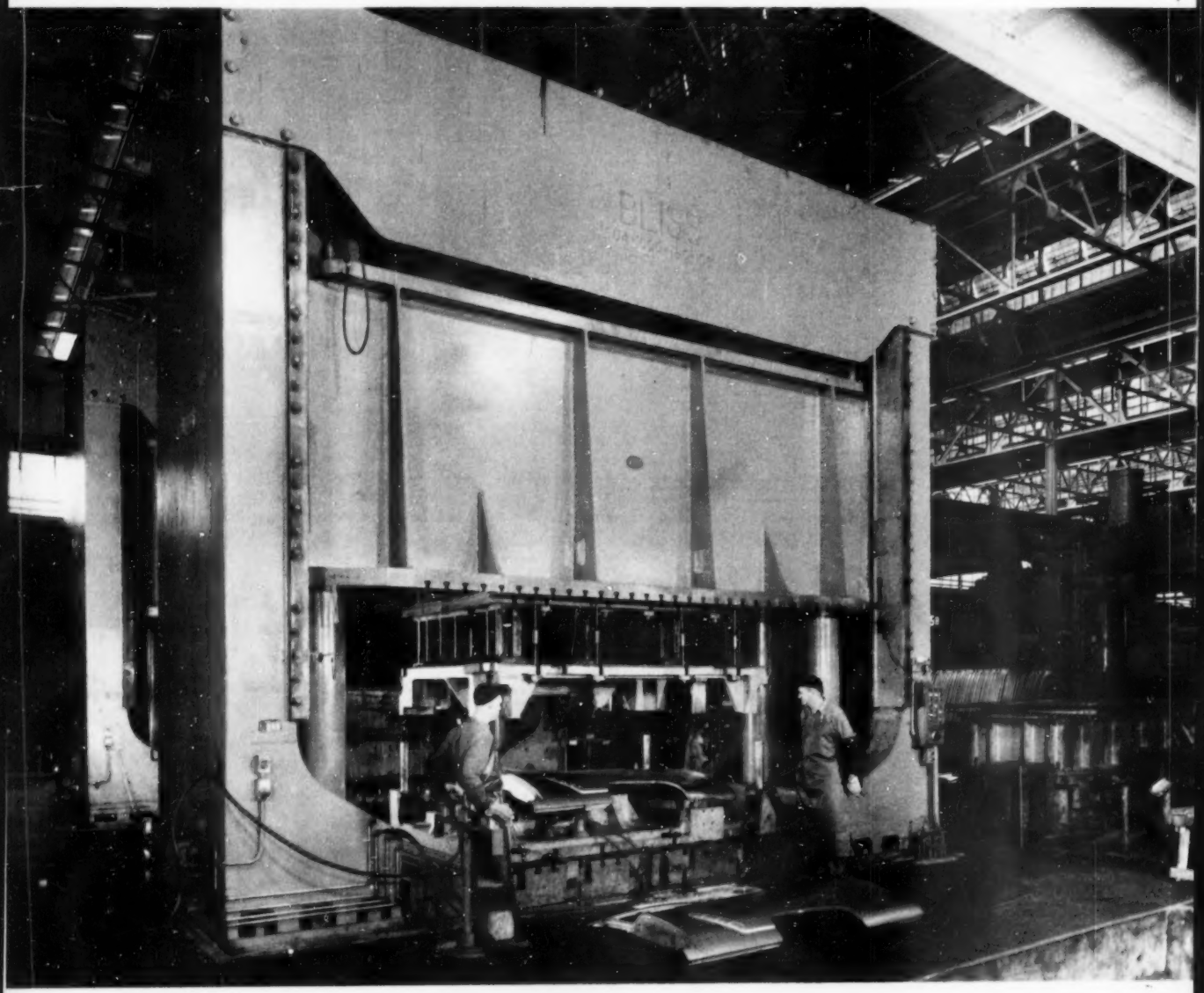
Forged gearshift-lever assemblies were formerly put together in a butt-welding operation, one at a time, and welded; then secondary operations were required to trim flash and buff the units. More modern practice dictates doubling up — in this case it is quadrupling production at a special induction-welding unit equipped with two sets of fixtures. One operator handles the welding work itself, while the other positions four new assemblies in readiness for welding. No further finishing is required on the brazed joints short of the paint shop. Forging is not necessary, which has saved money and improved working conditions.



furnace and die improvements save material

Among improvements to Ford and Mercury axle lines has been the addition of rapid-heating furnaces with semi-automatic loading and improved burners. At the swaging hammer, the tong hold has been reversed to allow including cutoff, which eliminates another press operation. On the flange-upset operation, improvements in the furnaces have allowed one man to load and unload. Die life has been increased by nitriding the single-impression dies. Materials saved on parts amount to 142 tons of steel during four months of production.



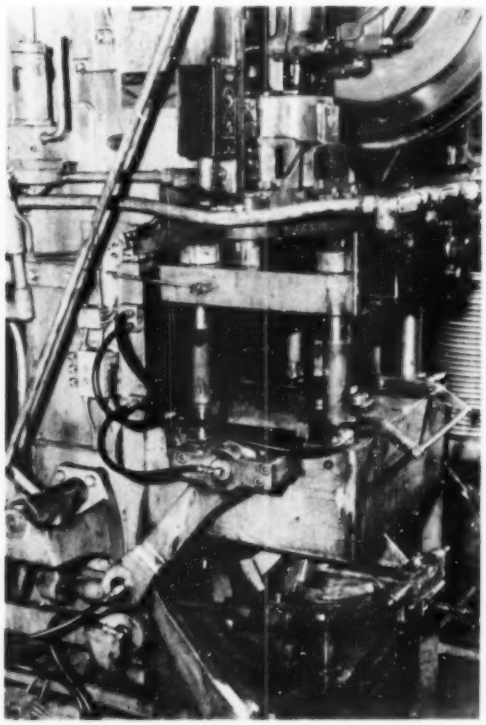


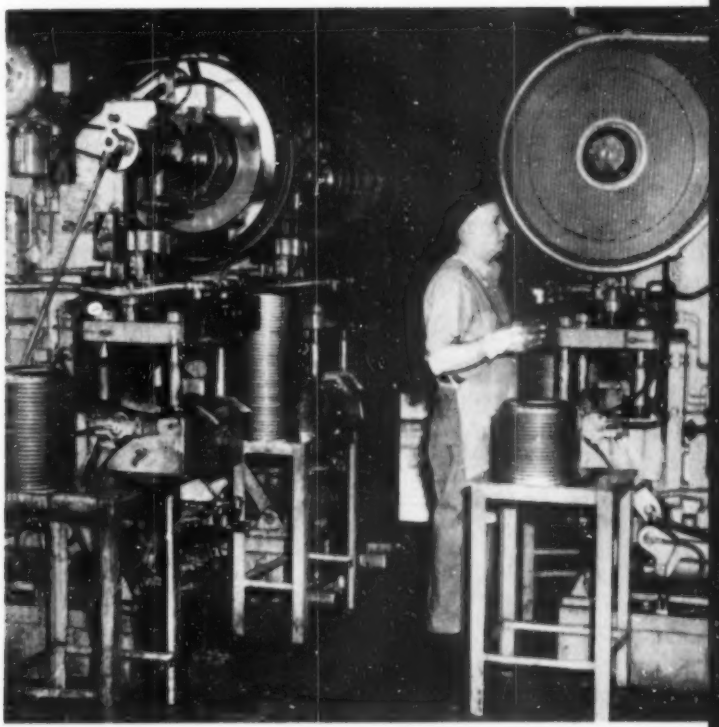
Buffalo stamping plant acts as model for other Ford units

Quarter body panels are blanked in this 180-in. Bliss press that ejects stock scrap through chutes to the basement below. Although this is a permanent installation, smaller presses are completely portable, allowing layout changes within hours instead of days, as were formerly required. Presses are relocated by overhead cranes when model changes or improvements dictate new locations. Both the Buffalo and Dearborn plants specify the same types of presses, so interchanging between plants is possible if necessary.

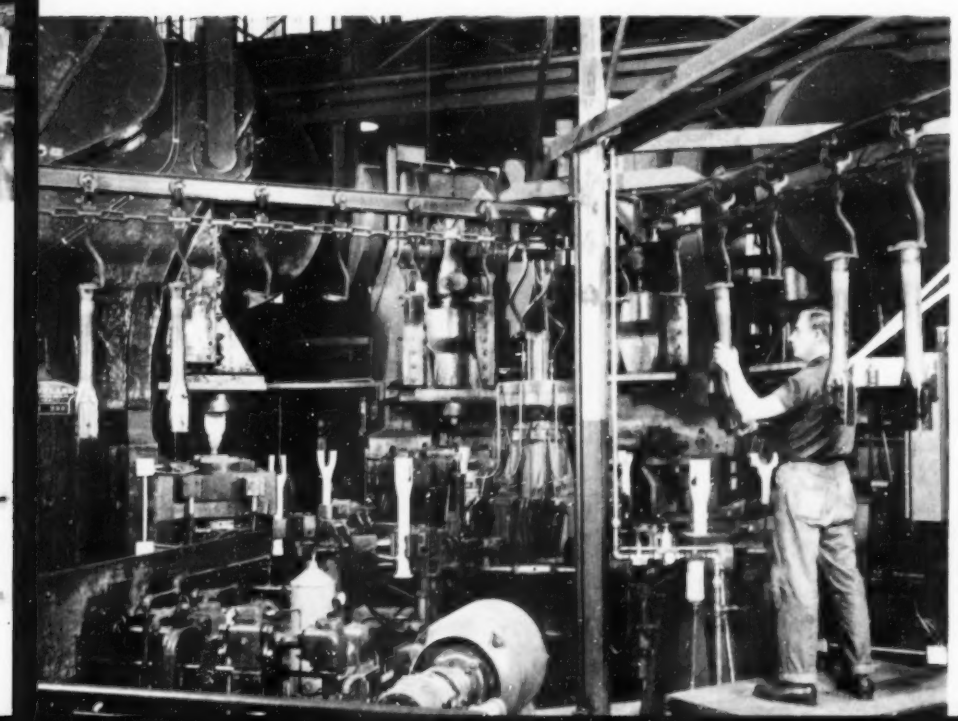
AUTOMATIC TRANSMISSIONS

indexing dies slot three similar parts





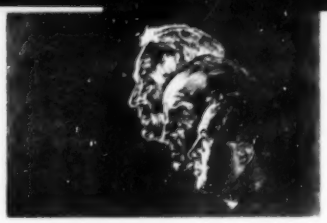
Two slotted blade shrouds and a slotted shell are produced from three indexing presses operated by a single man. Each die works in a 25-ton horn press equipped with safety devices that prevent operation when the die is open. Punches are cam-operated on throw and return, and indexing is controlled from a friction drive and detent plate that is positive in action to prevent doubling up on a stroke. Accuracy is good enough to allow recycling without cutting any more stock from the work. Cycle control stops the press after 31 or 33 strokes to prevent inefficiency. Production rate is up 108 pcs per hr per machine over older, less-automatic equipment. Finished parts locate and anchor a total of 64 individual blades

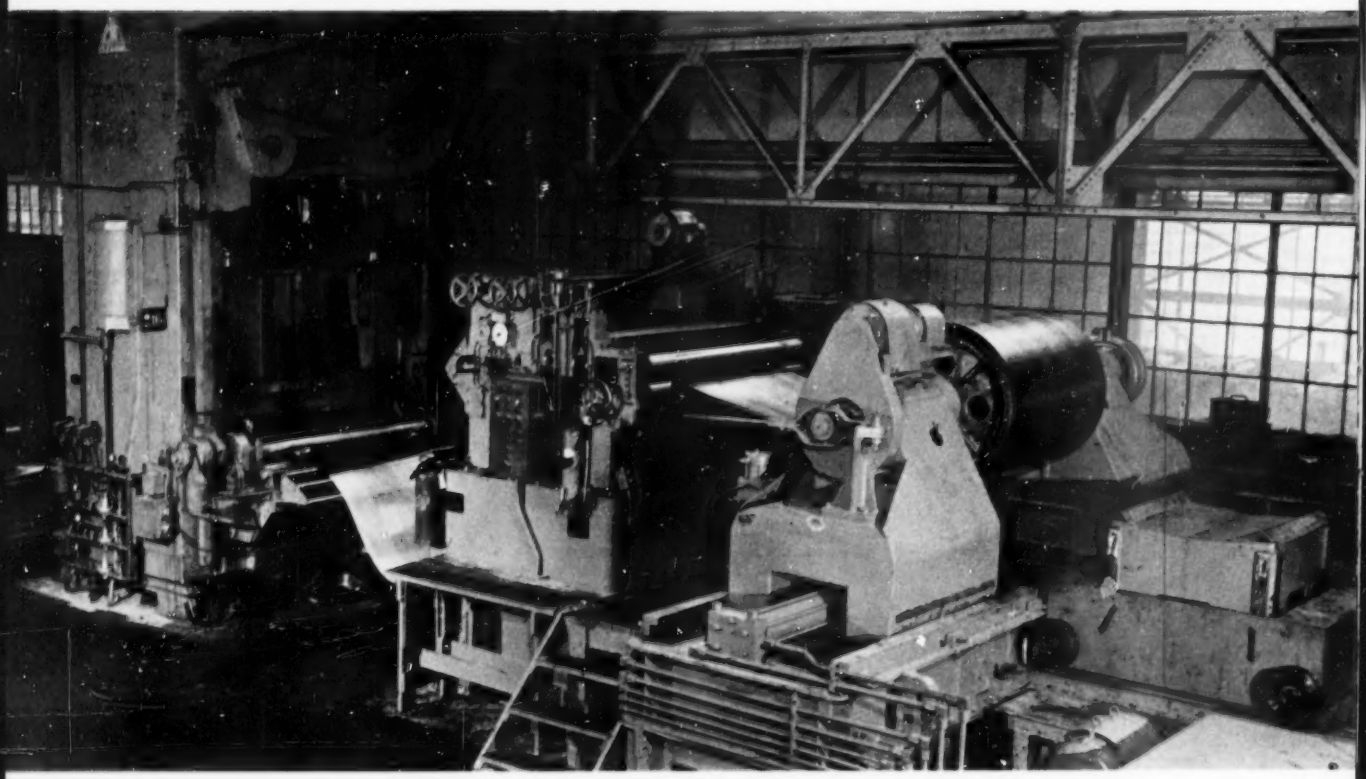


AXLE HOUSINGS

tube mill saves on housings and other parts

Originally installed to handle production of tube for rear-axle housings to save costs, new tube mills installed at the Mound Road plant have made additional savings by producing parts for other, smaller-production pieces. Small-parts production is fitted in between major runs on housings.





large Clearing press works coiled stock

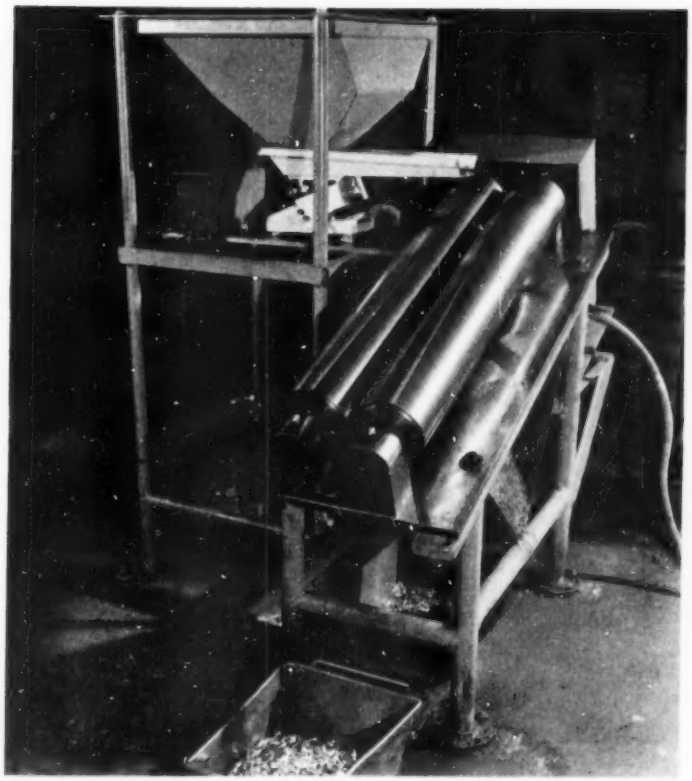
In spite of automatic coil winders and feeders, coiled stock is being adopted but slowly to the larger press sizes in most metal-working industries. This Clearing works coiled stock about 3 ft wide to produce sheet-metal parts (floor pans, dash panels, and such) in a cycle that is as nearly automatic as is possible at present. An automatic uncoiler and roll leveler work in front

OIL GAGES

bimetal stamping shifted to multi-slide

Two older press operations are performed on multi-slide machines that produce oil-pressure sender-gage bimetal parts by blanking, piercing, and forming them faster than the former press rate. Coil stock is run through the slide machines and finished parts are ejected into stock pans. Redesign of part made possible elimination of tweezer-positioning of parts in press die.

GENERATOR SEGMENTS



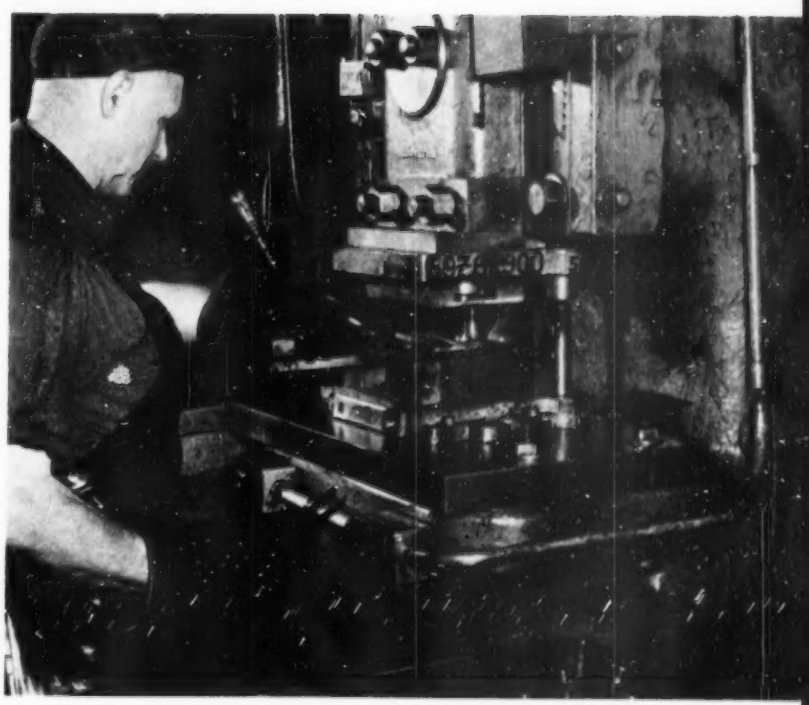
mechanical sorter replaces hand operations

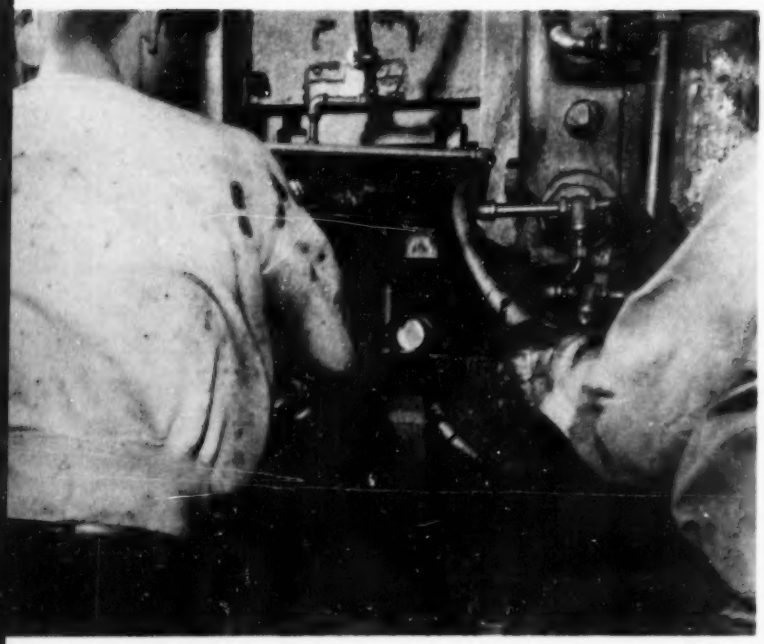
Commutator segments are now separated from excess trim stock by a mechanical roll sorter that needs no attention. The operator of the machine at the preceding station dumps stock into the hopper; then the high-frequency vibrator in the sorting mechanism moves the parts between the rolls. Trimmings fall between the rolls; good parts are carried to the tote pan.

BRAKE AND CLUTCH PEDAL

press staking makes better assembly than welding

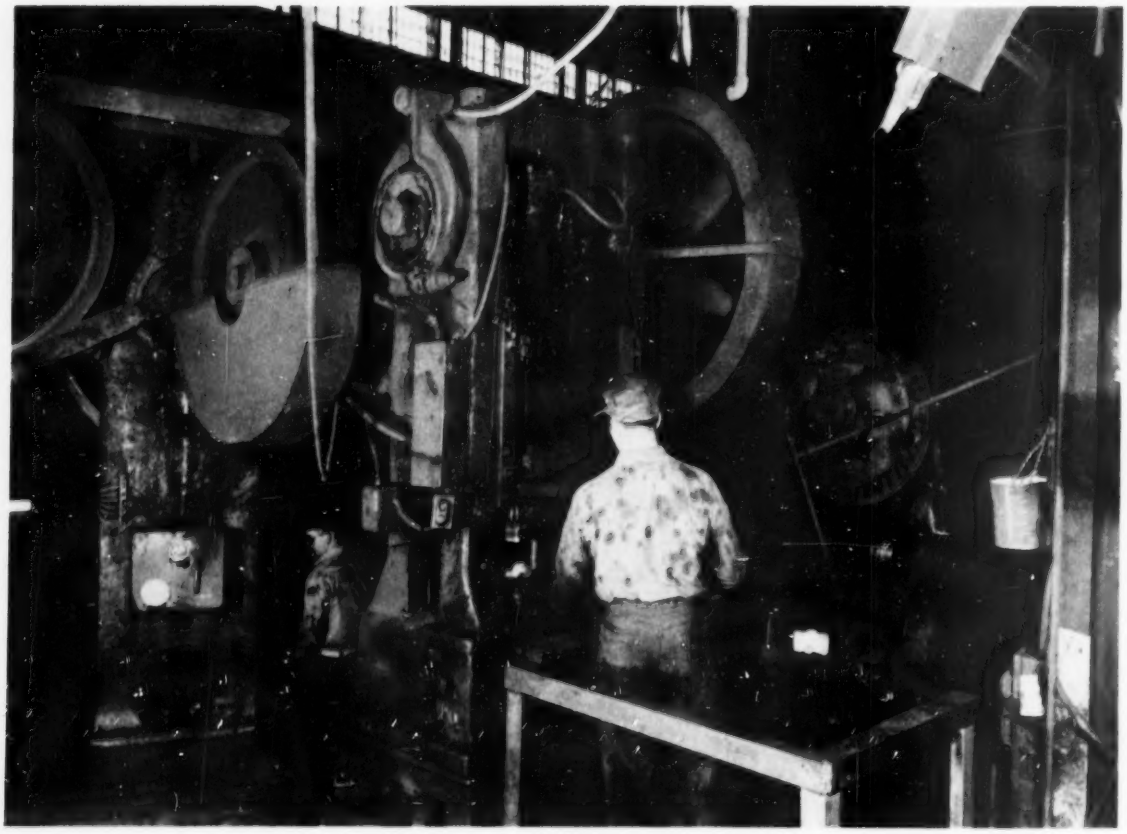
Pedal hubs were formerly welded to the pedals by hand, a slow and monotonous operation. Now this job is done at a press, where each hub is forced over the pedal and is staked at the same time. Working conditions are much improved because spotwelding was eliminated.





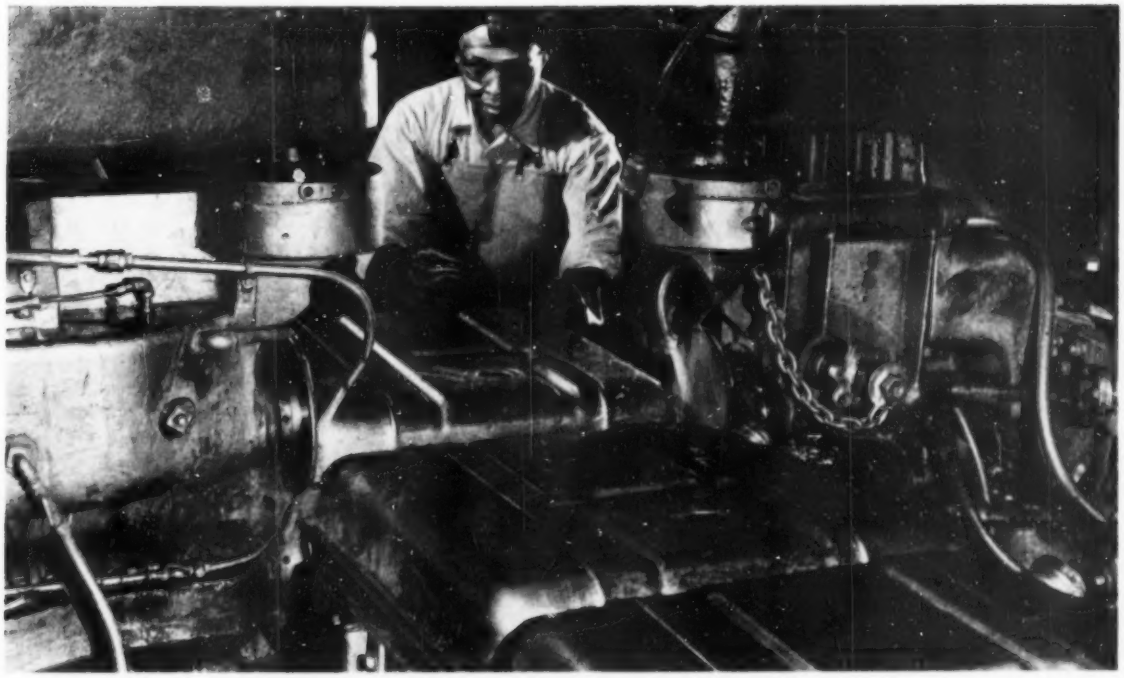
extruding press outproduces forging hammer

Scale produced during heating at an induction setup prior to extruding spindles in a press does not harm the work because it is light. Another advantage of press-extruding over forging is consistently higher production. In addition, the new press setup includes automatic rejection of overheated billets by radiamatic pickup head that sights billet and operates reject mechanism on press feed if billet is too hot. The 1600-ton press extrudes a finished forging with one stroke.



FUEL TANKS

dual welding seams tanks at top speed

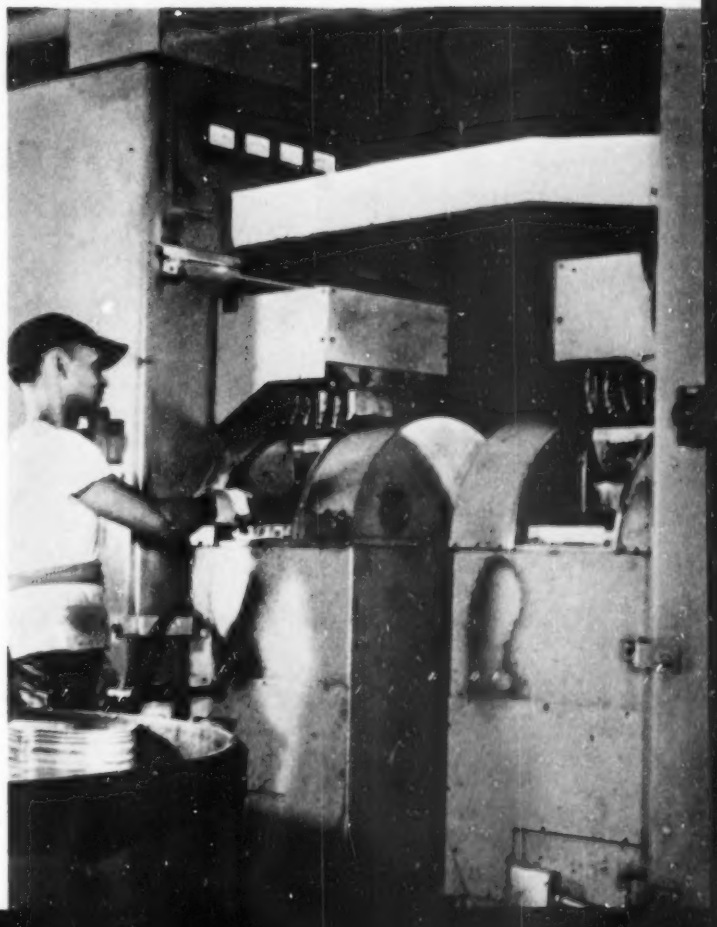


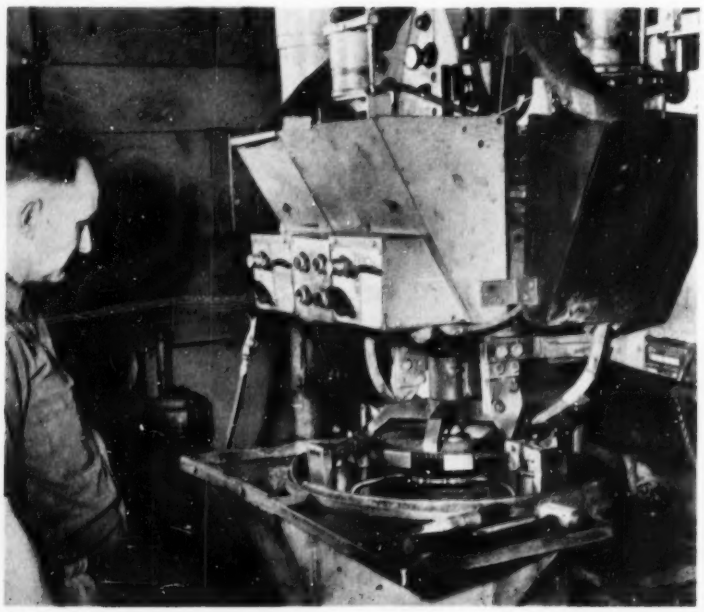
A machine with two sets of rollers seam-welds gasoline tanks along two edges, then the tanks are rotated 90° and conveyed to another welder that joins the two remaining edges. Recent advances in welding techniques, better conditioning of the wheels, better power control, and addition of hard-alloy copper welding rolls to replace the older soft forged rolls that were expensive and difficult to hold to tolerance have improved this operation.

SUSPENSION BLANKS

point-softening prevents tearing blanks in press

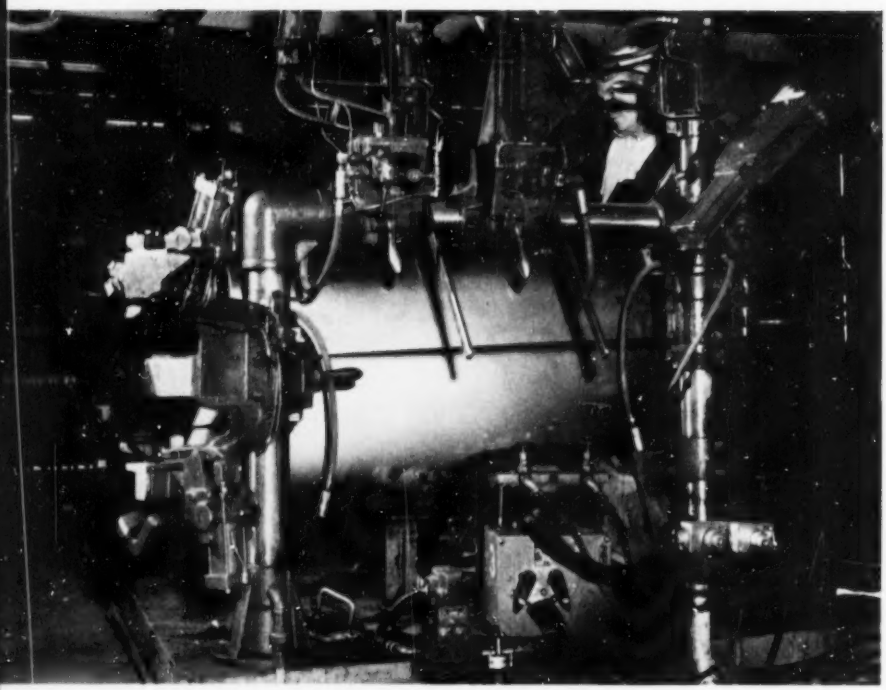
A 100-kv two-station induction-annealing unit has been installed to improve quality of work fed to presses. The front-suspension, upper-arm blanks are carried by a ferris-wheel that holds them in position to allow the heater to treat only the portions that must be annealed. Localized heating eliminates the need for protective atmosphere and prevents distortion of the parts. There has also been a saving in floor space over the old annealing setup where the blanks had to be annealed all over.





dash pots cushion self-indexing weld fixture

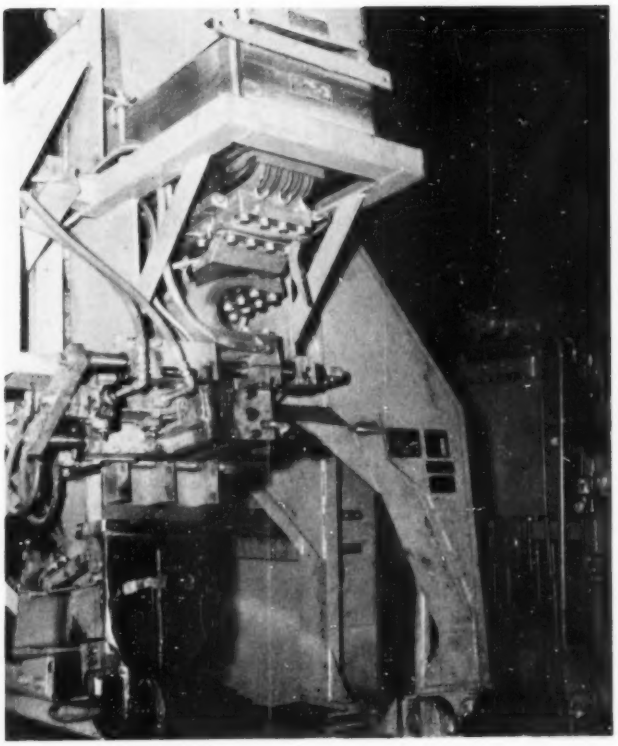
Ring gears and cover plates are assembled in a spotwelding fixture, then the fixture plate indexes five times so double electrodes can make ten spotwelds, two at a time. Only manual work is loading and unloading the fixture. Electronic controls on the welder insure spots 0.400 in. in dia with penetration 0.100 in. above and below the interface. Cycle time is 25 sec; welds cannot be misplaced or interfere in the final assembly.



BODY

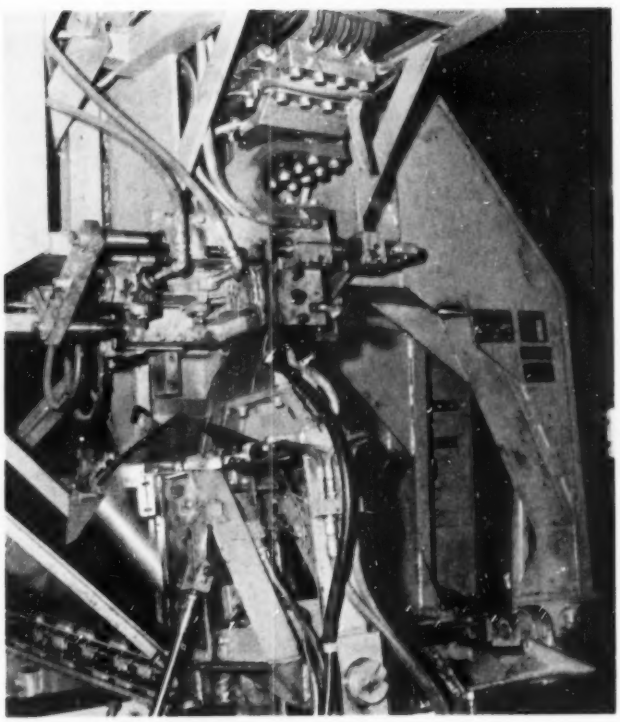
power clamping leaves more welding time

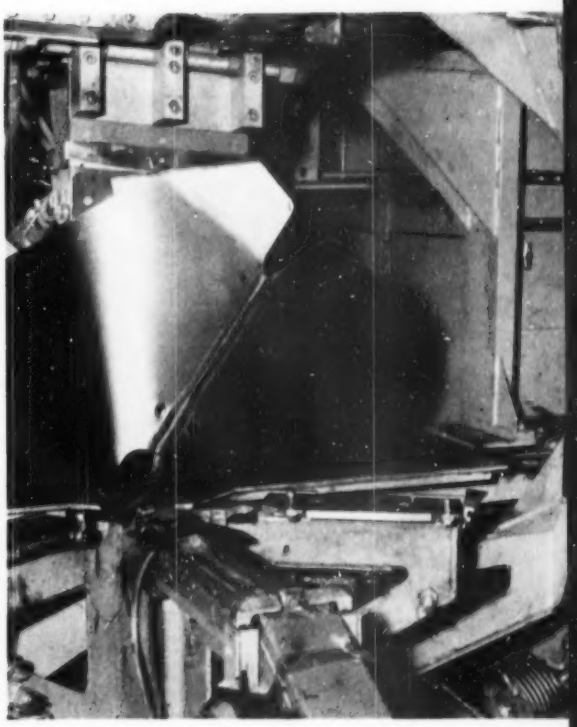
Swinging gates and clamps on a body buck have been closed and locked by the welding operator for many years. However, operating the clamps is a difficult bit of work, and it is somewhat hazardous. An addition to the buck is a set of clamping air cylinders operated by an air valve. Now the operator manually closes and locks the gates, but clamping is done with power. This leaves the operator more time for welding on body and panel members in the tight time cycle.

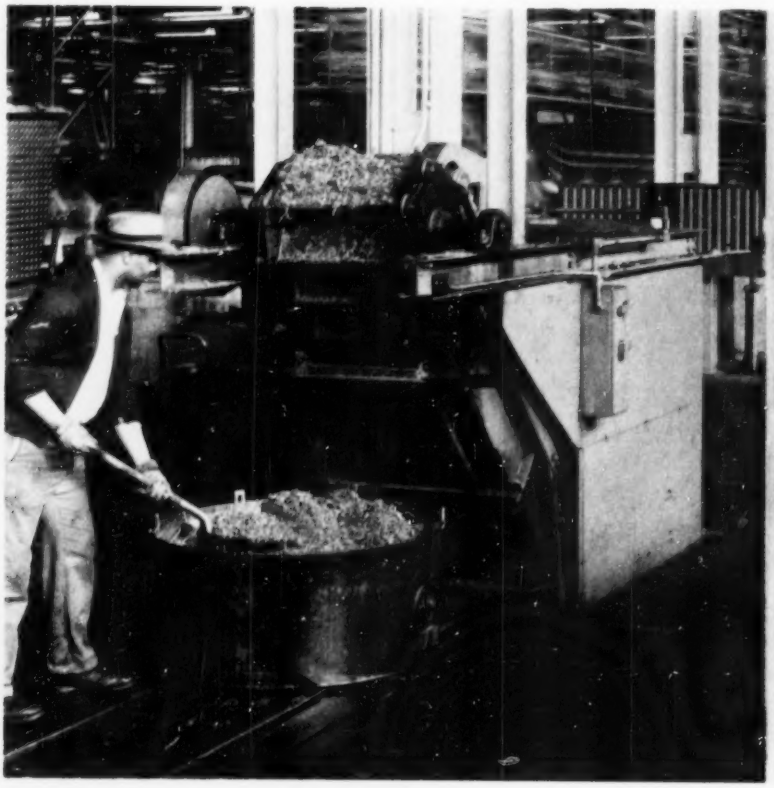


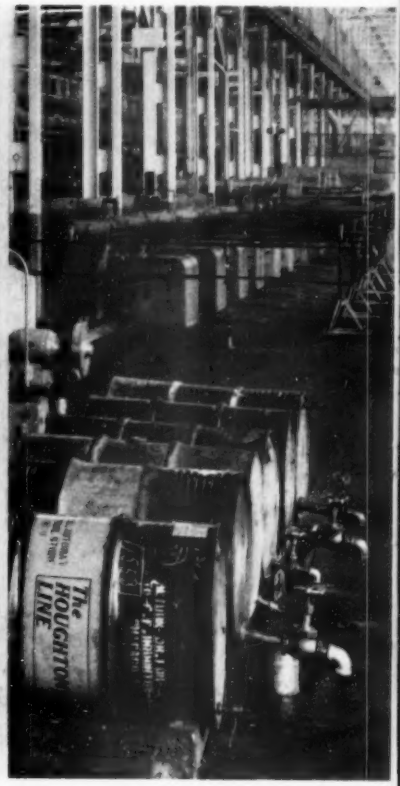
mash welding press quick-disconnects for other jobs

Some subassemblies do not require a full day's run to keep up with production, so there is time available for other jobs—assuming the main fixturing can be cleared from the machine. This is handled by quick-disconnect fittings for hydraulic and electric power and for air and water. In welding the fender, hinged sections of the fixture do forming. Stock is clamped, then folded up to form the front end of the fender while side units wipe the fender sides into position. The welding wheel is on a hinged arm that moves in, makes the weld, then retracts to allow unloading the fixture.

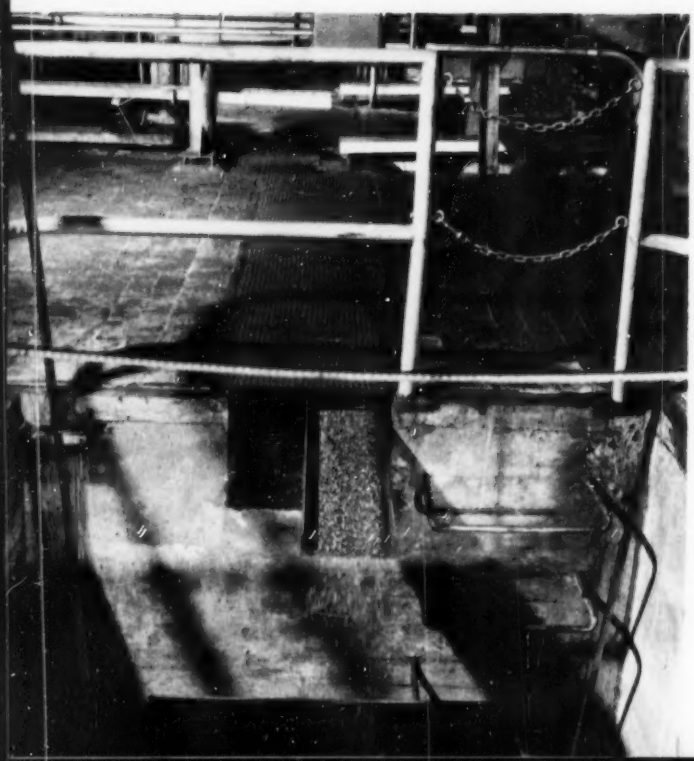








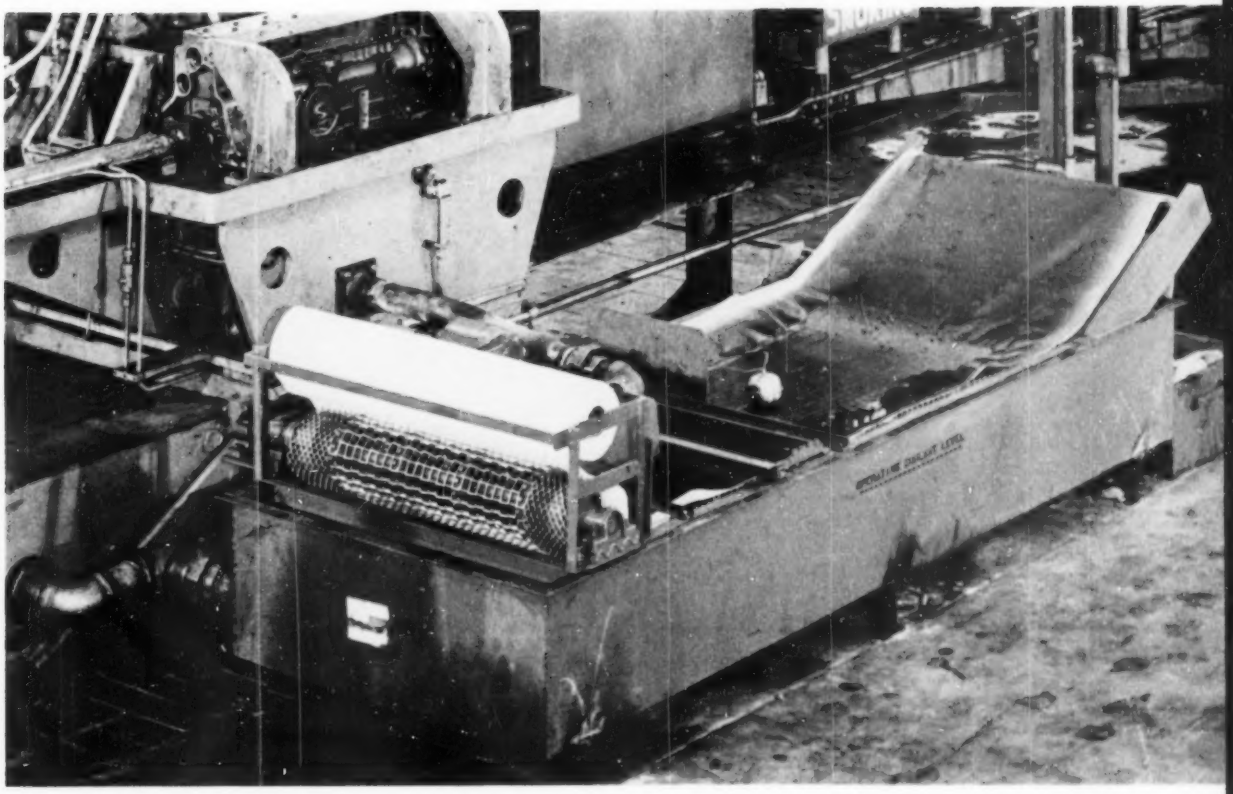
central systems establish plant layout

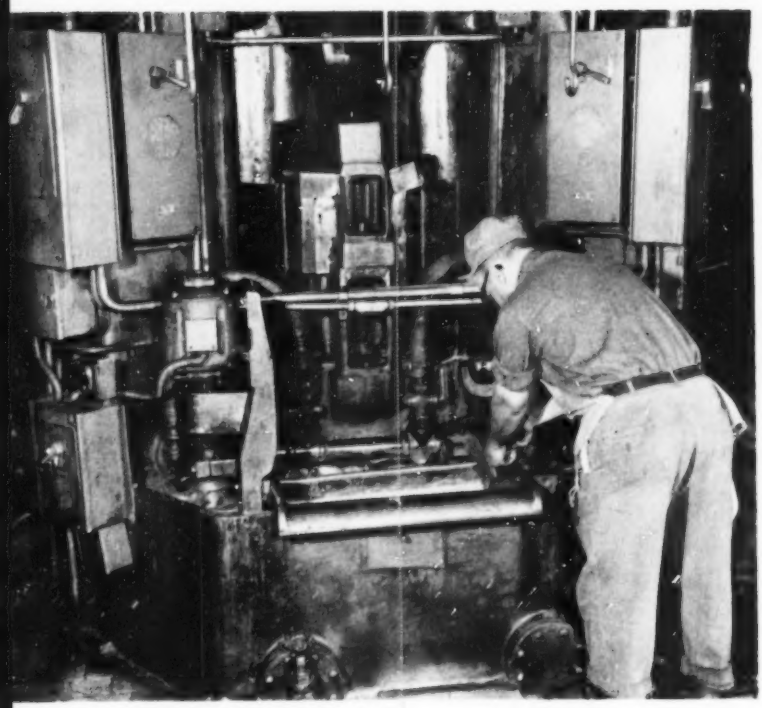


Trends in the past decade have moved toward non-separable plant installations, like this chip system, where a permanent layout for purposes of economy of service facilities applies to machine layout as well. Here an apron conveyor leading up from under a bank of screw machines discharges chips into a hopper prior to wringing. The savings on both chips and coolants obtained with an efficient central system makes such high-production installations economical.

under-floor conveyors are independent of layout

Central chip-processing facilities can be fed by under-floor conveyors like this oscillating unit. If sufficient inlets to the under-floor system are established, some layout changes can be made above without ruining the system. The conveyor here feeds to a skip in a floor well, from which chips must be emptied periodically. Normally, attendants empty skips in a routine circuit; however, electric switches flash warning lights and cut off conveyor power if the skip is full.



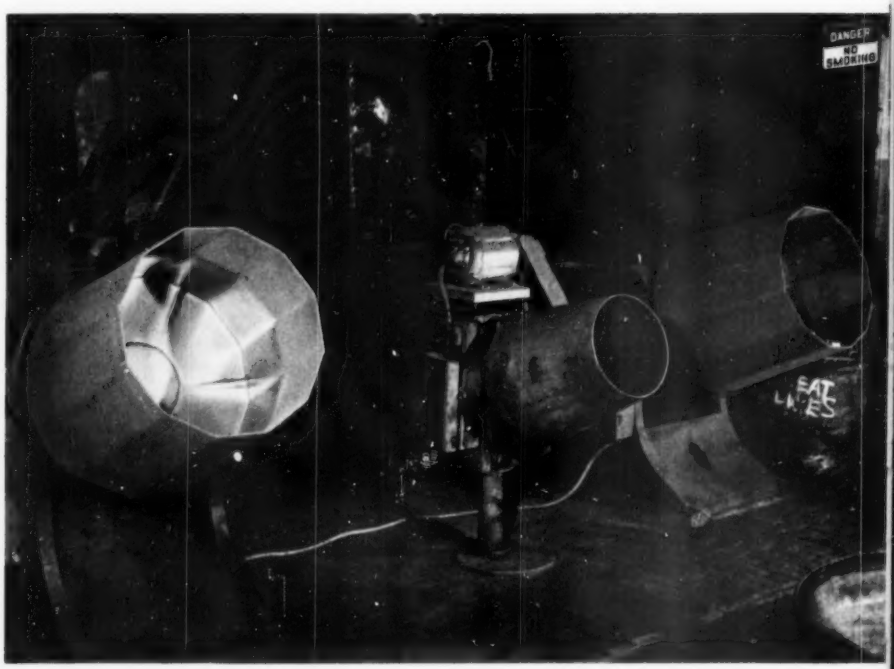


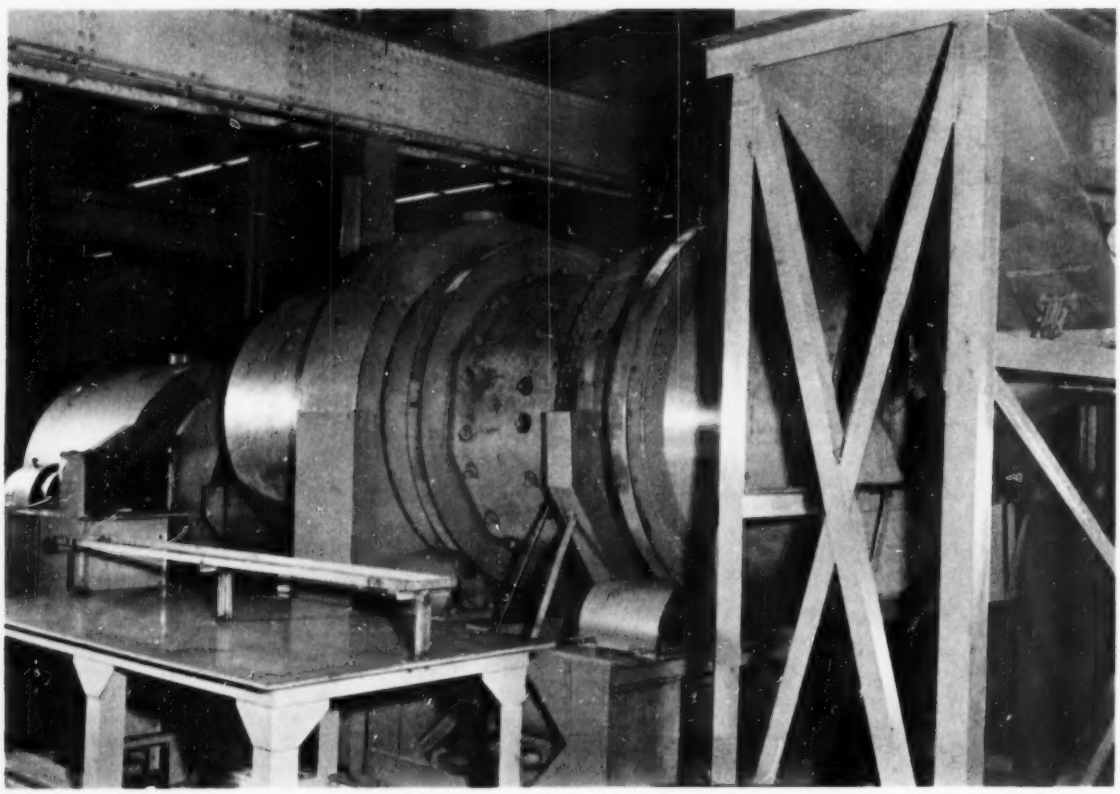
work improvements stem from centralized coolant filtering

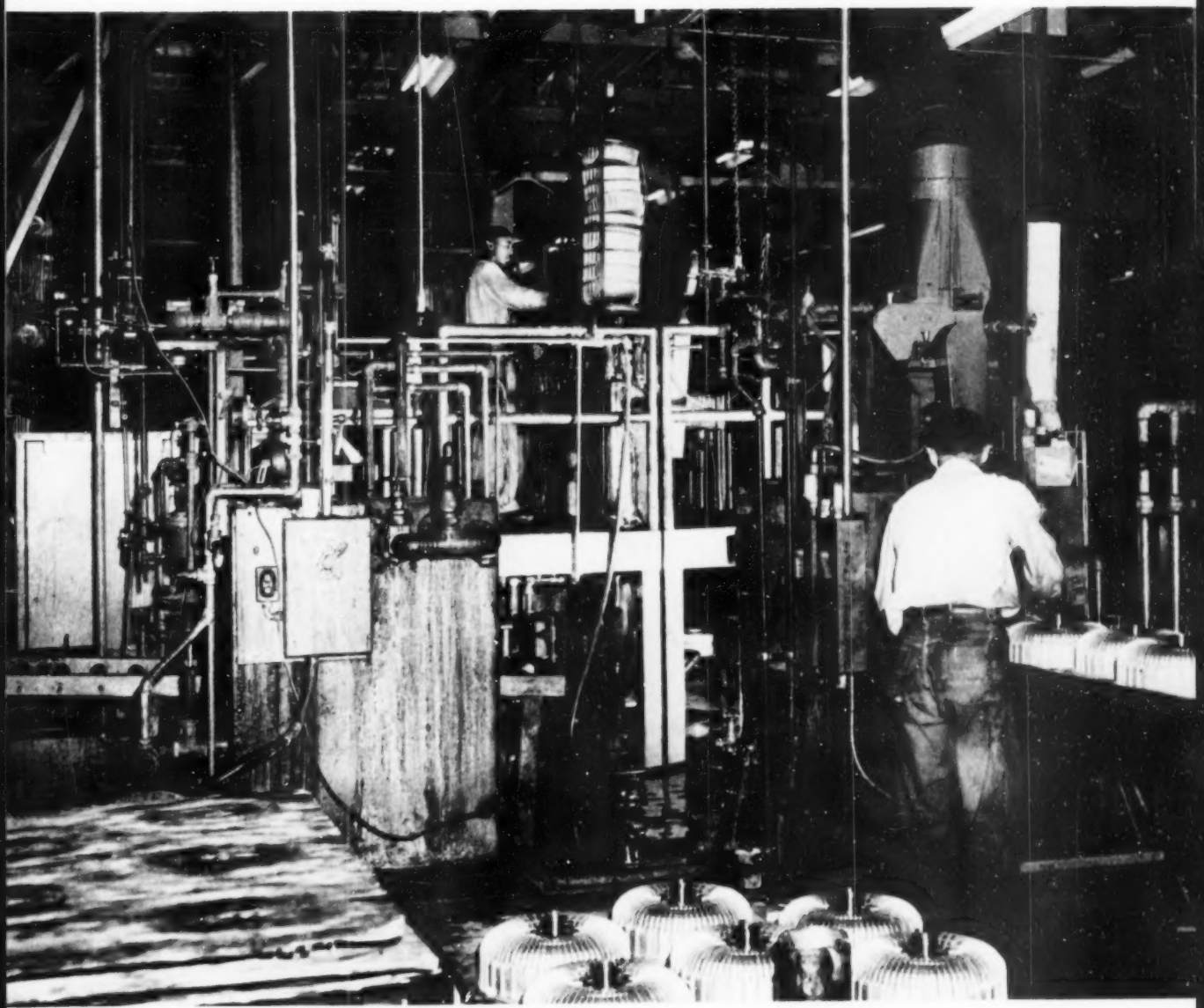
Old-style self-contained coolant tanks (left), cleaned out by operators wielding shovels and rakes at the end of each shift, have largely been replaced by centralized coolant cleaners like this Delpark unit (above). Sludge is removed from the grinding area immediately, conveyed to a settling pit, and lifted out into removal cans by drag conveyor. Coolant, which has washed through the lines to the pit, is passed through a filter which removes almost all of the sludge and dirt—much more than could be removed by the old system. Among direct savings of central filtering and settling are improved work quality, reduced scrap, and 20% increase in wheel life. In addition, all manual work connected with coolant cleaning has been removed from the production floor.

continuous deburring pushes up production rate

Batch production in removing sharp corners and improving surface finish on small parts is not the ultimate in efficiency, as can be seen in the two illustrations on this page. Small-batch tumbling barrels have been used for years; however, a subsequent washing operation has always been necessary. Recently a continuous deburring machine was installed to replace the batch equipment. It is fed from the hopper at right, and automatically runs parts continuously through deburring, separation of parts from abrasive, and washing; all in one operation.

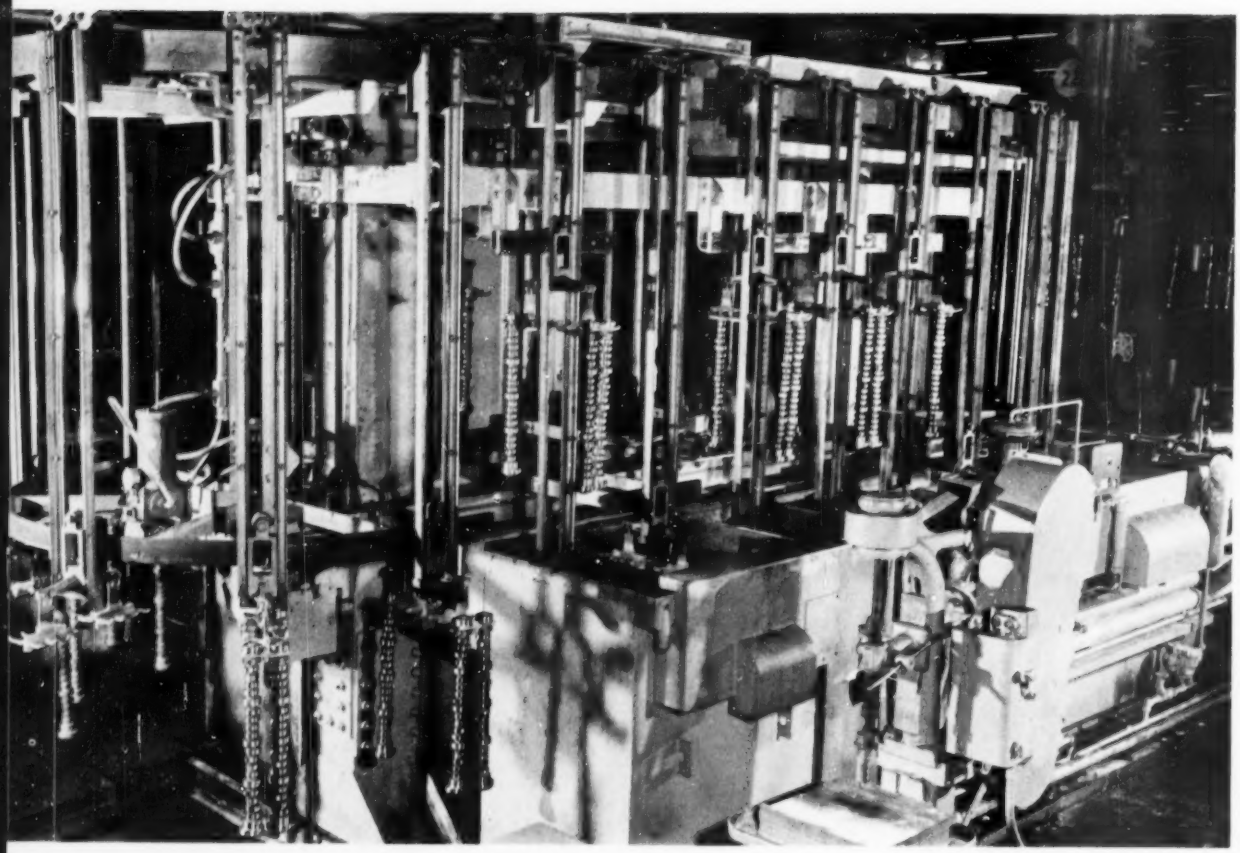






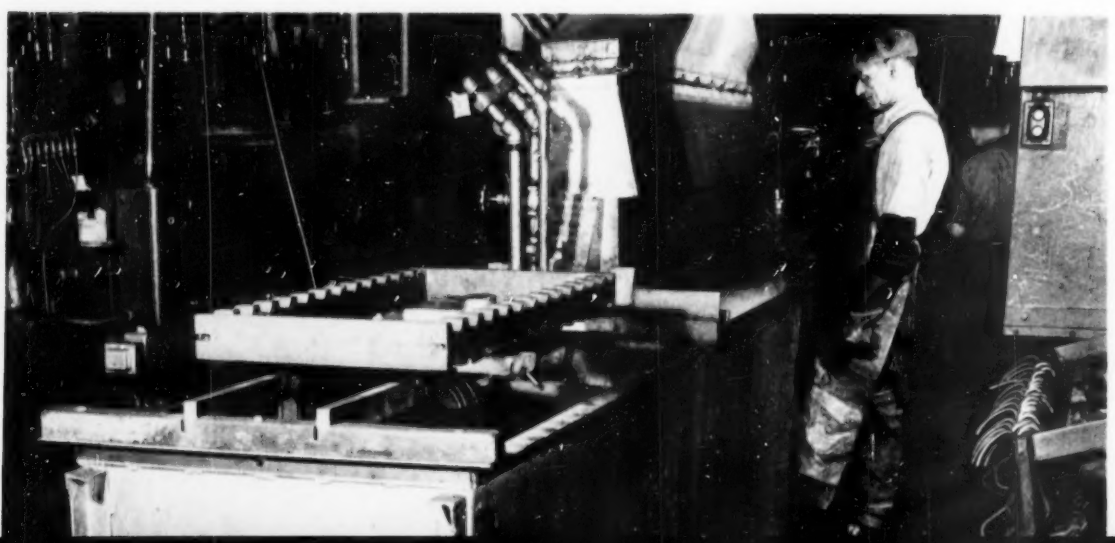
transmission parts impregnated for positive seal

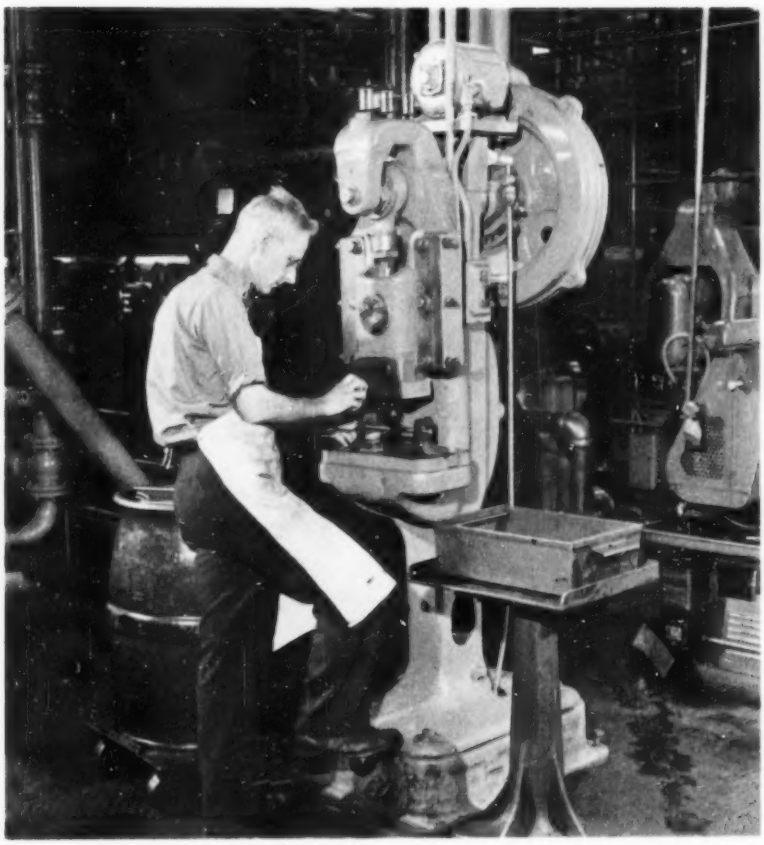
From fifty to sixty percent of all die or iron castings received for use in automatic transmissions have enough porosity to affect their service under difficult conditions. To reduce this source of scrap, an impregnating unit is operated to seal up the pores in the metals. A steam-heated storage tank, circulating pump, and high-pressure autoclave do the job. The sealing compound, which is introduced at the autoclaves, is sodium silicate with fine particles of copper, aluminum, carbon black, and potassium permanganate. When forced into the castings at 700 psi, the permanganate oxidizes the metal particles, which swell and seal the castings. With this equipment, all but about 5% of the originally rejected castings can be salvaged.



automatic dipping replaces handling in phosphating room

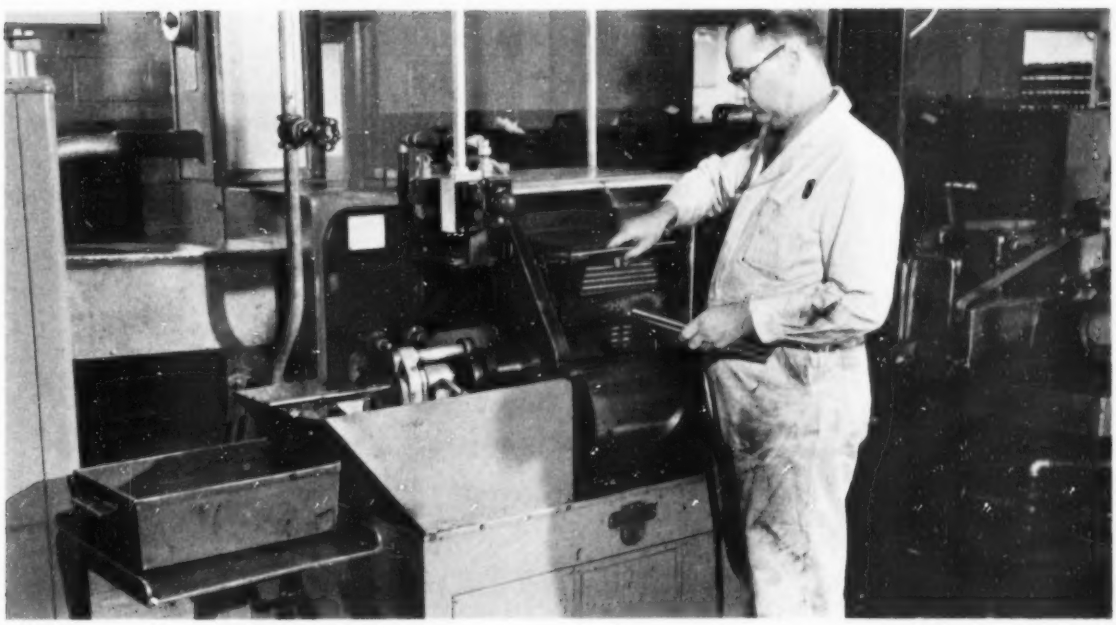
Held-over hand methods still retained up until a few years ago in the phosphating department depended too much on operator judgement. A skilled worker had to time each batch of camshafts in the liquid baths. In addition, the work was somewhat dangerous. The new setup includes an automatic dipping conveyor that times the shafts through all cycles without attention. Once set to the required timing, it goes through its paces alone. As a result, quality of work has uniformly improved, and working conditions are much better.



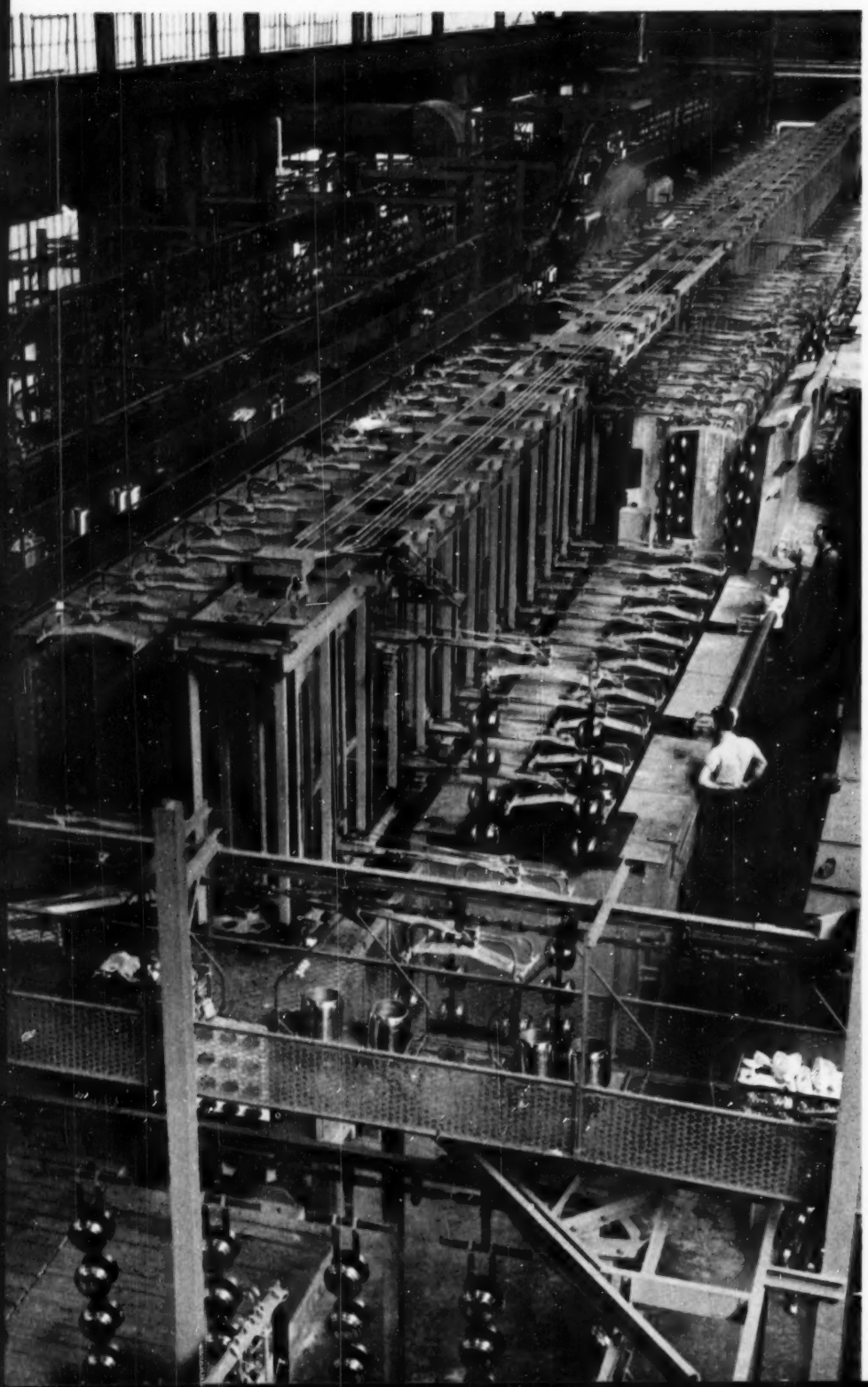


induction hardener eliminates straightening job

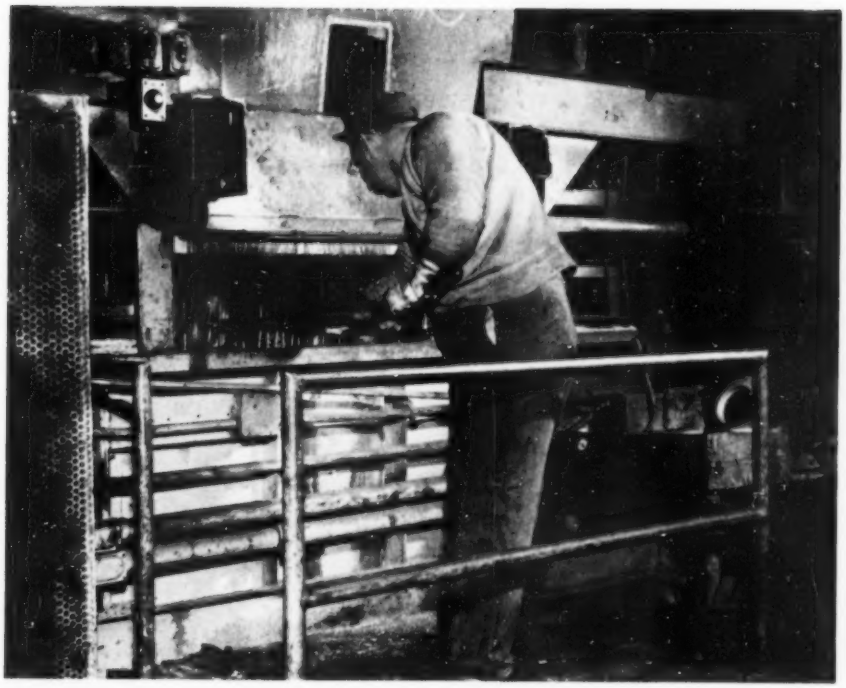
An experienced operator had to straighten these small shafts after the hardening operation; several handlings of each piece were necessary, and the job was mentally fatiguing. Modern methods have eliminated the straightening requirement through better quality control during heating. An automatic induction-hardening machine is fed by magazine. It heats, then feeds the small shafts through a quench operation. Better control over final hardness and depth of hardening are possible, and production rate is faster. Drawing to reduce brittleness is no longer required.



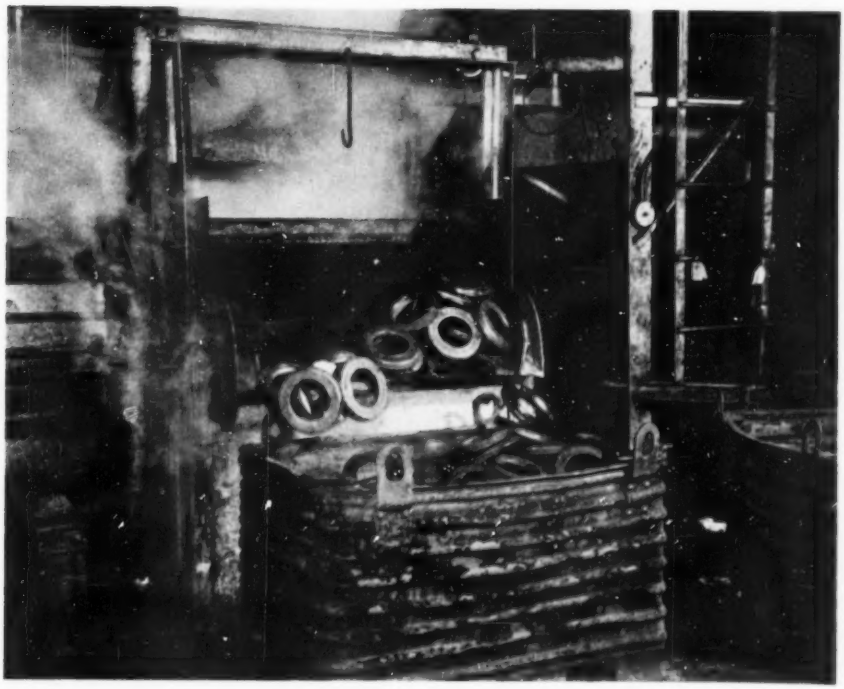
automatic line sharpens control on plate quality



Replacing numbers of job-lot plating-solution tanks, where parts had to be moved manually and timed by the operators, this two-lane automatic plating machine does the work better and provides better working conditions. Parts are carried on racks, which are conveyed from tank to tank and are oscillated mechanically and timed automatically. Heated solutions and air agitation permit higher current densities, which reduce plating time.



machinability improved; shot-blasting eliminated by iso-thermal annealing

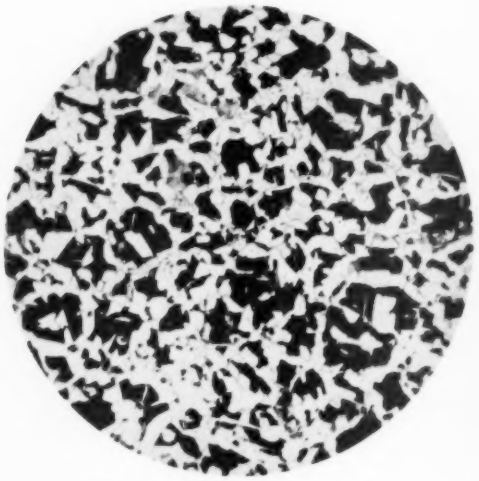


Steel forgings were conventionally normalized to equalize grain size, harden the surface, and to provide uniform response to subsequent heat-treatment. Unfortunately, the long controlled cooling cycle also produced layers of scale and physical distortion, both of which make machining difficult and costly because of tool replacements. To get rid of scale, either pickling or shot-blasting was required. Savings possible from iso-thermal annealing, by gas

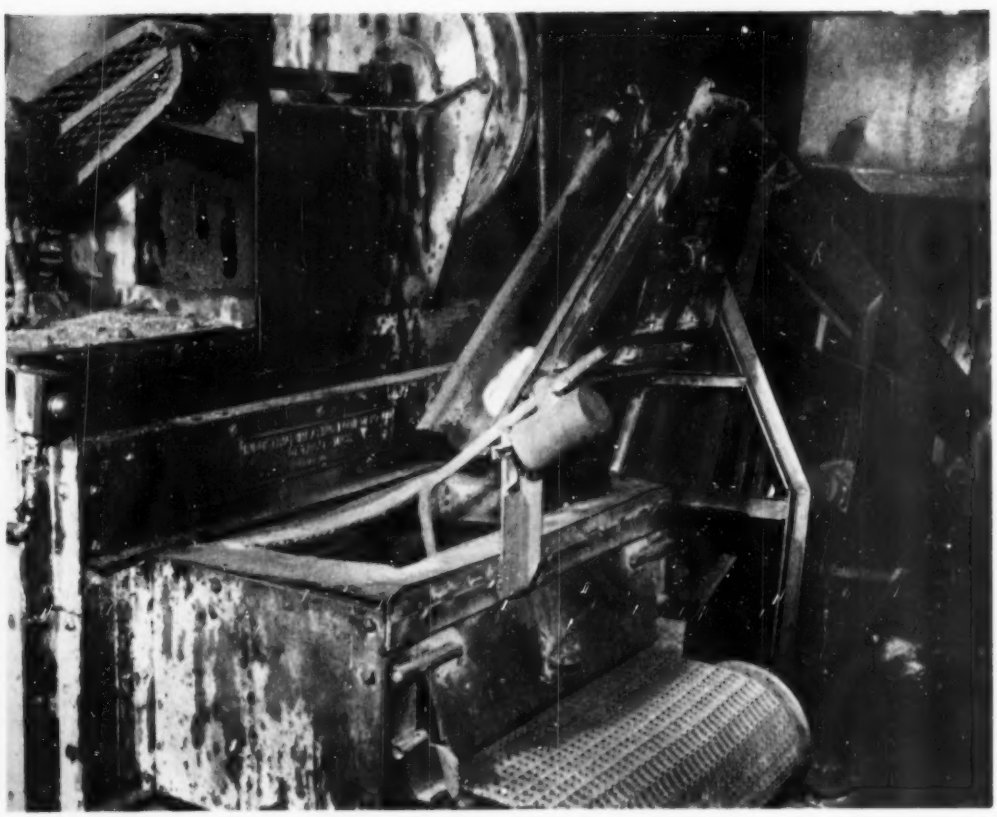
Please turn page

machinability improved; shot-blasting eliminated

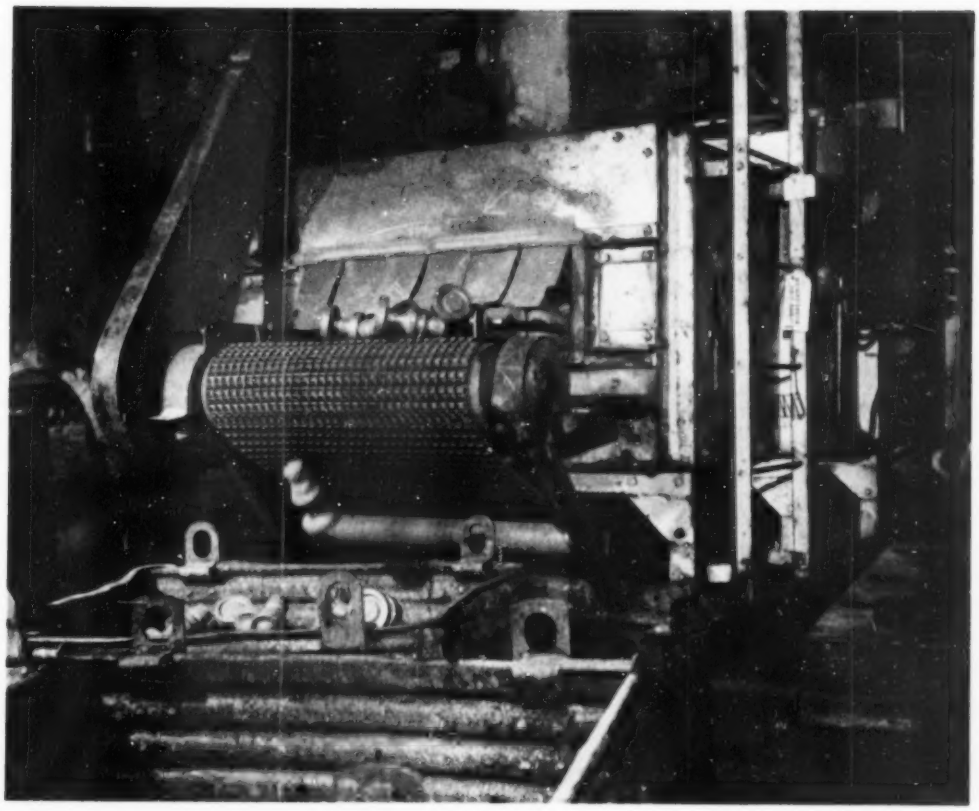
RING GEAR, GAS-FURNACE NORMALIZED



RING GEAR, SALT-BATH ANNEALED

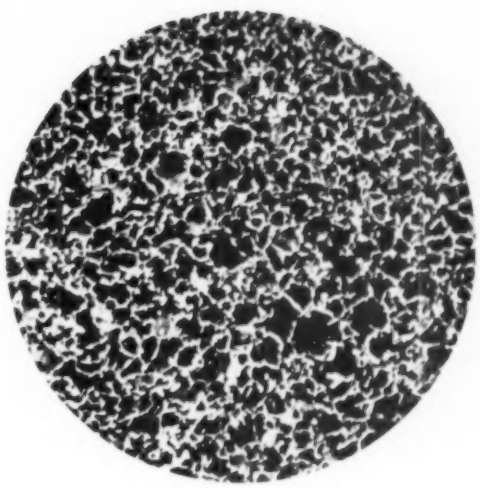


by iso-thermal annealing . . . continued



furnace or salt bath, were proven out on paper by cost analysis, and were tried out in the shop. First, equipment for electrode salt-bath treatment was installed. This resulted in savings in fuel, time, and manual work; improvements in machinability; and in elimination of shot cleaning and large stock bins for material hold-over. Comparison between grain-structure photos showing normalized and salt-bath-annealed forging sections indicates the improvement in machinability. The two photos show loading and unloading stations at the continuous salt bath that now handles annealing. The forgings go into the bath at temperatures over 1500 F; are held at 1190 F until grain transformation is complete; then are dipped in hot water for 2 sec to remove salt film.

Iso-thermal annealing is also now performed in continuous gas furnaces, as shown in the two photos on this page. A mesh belt conveyor carries the parts through directly after they have come from the forging press. Residual heat of forgings saves fuel by helping maintain furnace temperature. The steel structure, also shown, is of evenly dispersed grains which indicate easy machining and low distortion of the product.

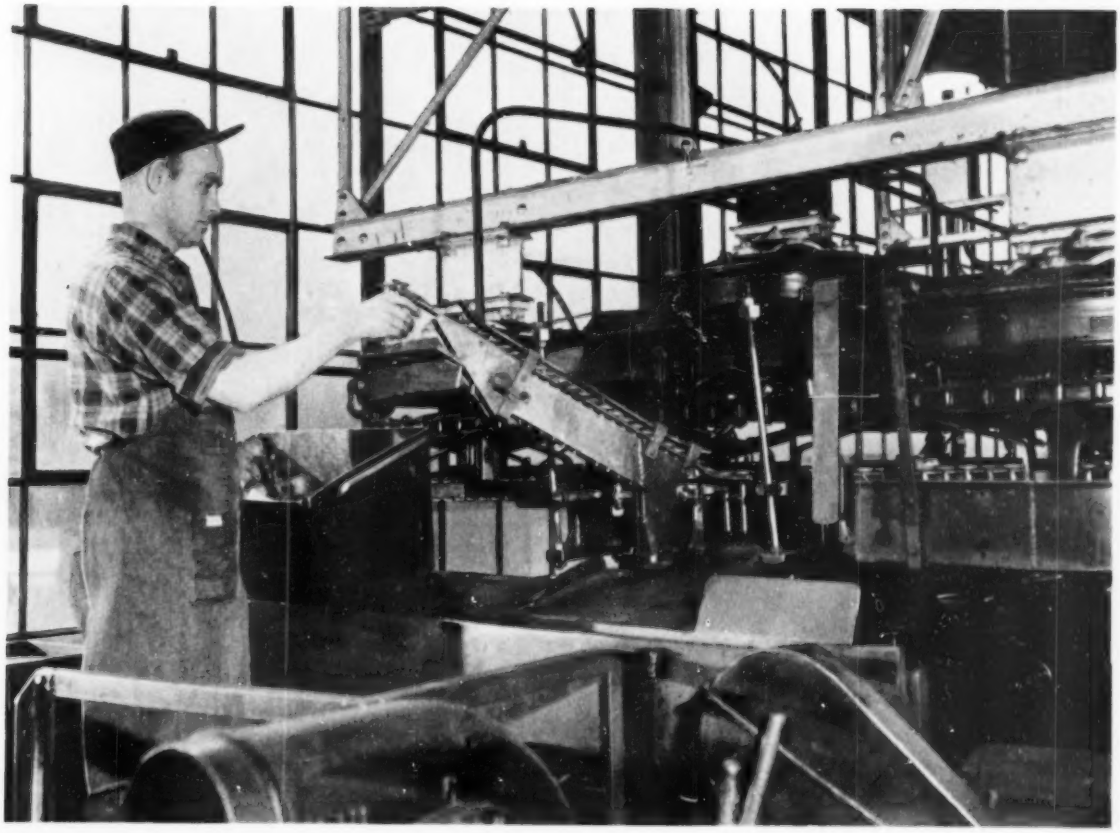


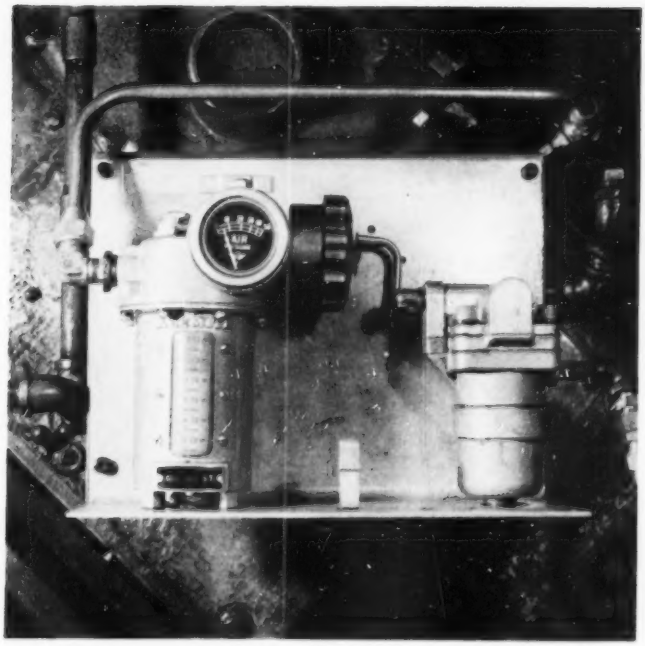
CLUSTER GEAR, GAS-FURNACE ANNEALED

centralized screw machines permit efficient coolant treatment

166 automatic screw machines are grouped in the standard transmission and radiator plant in space formerly occupied by service-parts equipment. Cutting-oil service is provided by an 80,000-gallon system that recirculates 8000 gpm through gravity troughs, settling tank, and a 20,000-gallon clean-oil sump. Turnings and chips are carried by conveyors that drain off the oil into the recla mation system, then move the chips to crushers and storage bins. The chip system includes crushers, wringers, and pneumatic conveyors that blow the treated chips to gondola cars on a rail siding. Beside economies resulting from chip handling and oil savings, working conditions have been improved, and loading and storage racks are in much better locations because the floor area is clearer. To allow moving the screw machines in, a two-year run on service parts was made.

auto loader fills conveyor racks rapidly





Early operation of the master valve conveyor serving the Northville plant called for a man to load individual valves onto racks carried by the conveyor, which was a difficult job because each valve had to be fitted into niches in the carrier racks. Now a new installation is working, whereby an operator can load valves easily into a chute and the valves are loaded onto the conveyor racks automatically. Similar equipment between machining operations makes parts handling in the plant semi-automatic.

Alemite lubricating system saves oil on drill

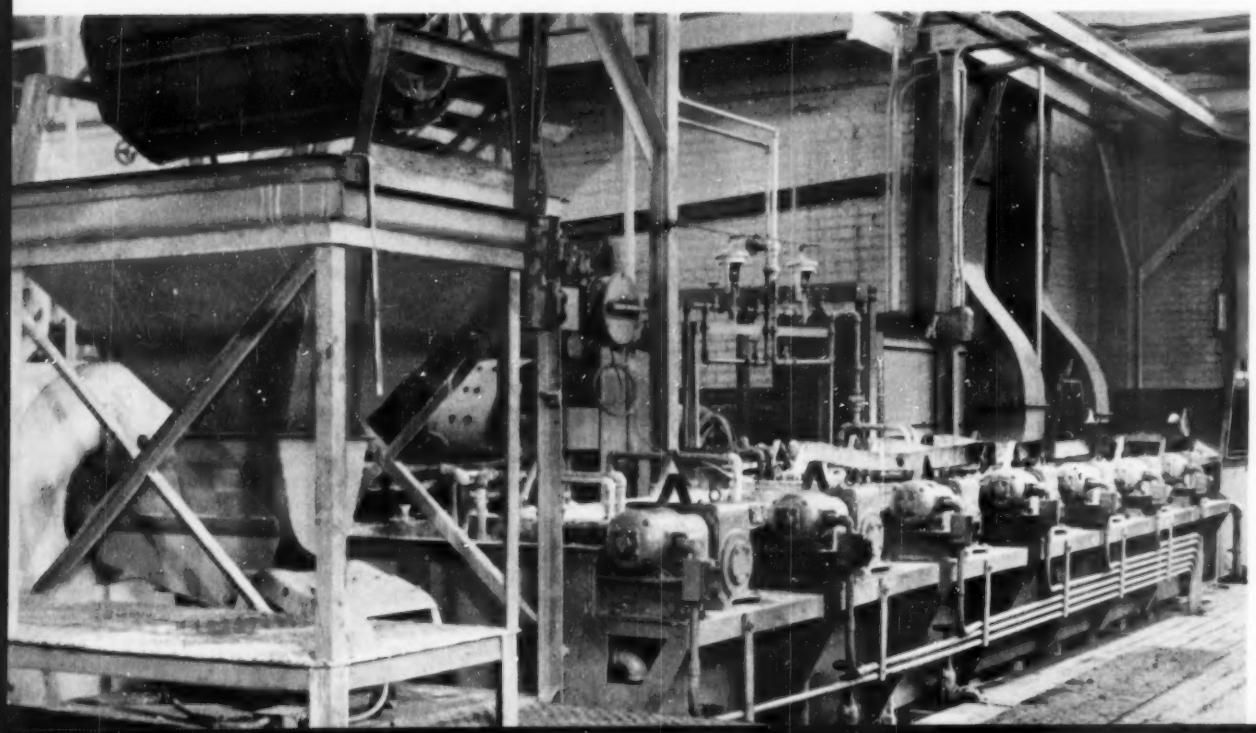
For years an oil-bath system lubricated a multi-head, 5-way drilling machine that works on engine blocks. Tried on an experimental basis, an Alemite "oil-mist" lubricator has been operated for some time, saving something over 1000 gallons of oil per year on that one installation. Main saving is in elimination of oil seepage through the oil-bath seals—which amounted to 6 gallons of oil per day. On the basis of 27 other installations made to date, the fittings will save about 34,000 gallons a year.

Maizo blast smooths small parts economically

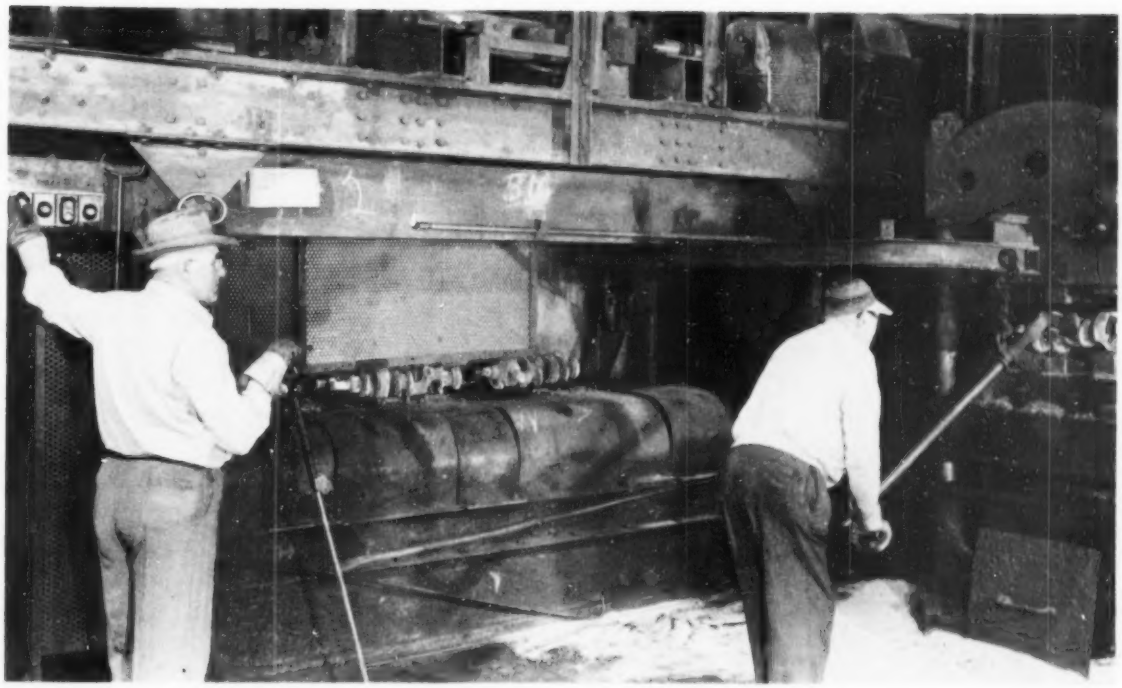
Automatic-transmission parts made from aluminum and other soft metals are deburred and surface-finished by Maizo blast, a modern method that replaces old hand methods that depended upon operator skill. The system blows soft materials such as ground walnut shells, corncobs, or grain against the parts at high velocity by means of compressed air. Costs are lower, and quality is much improved.

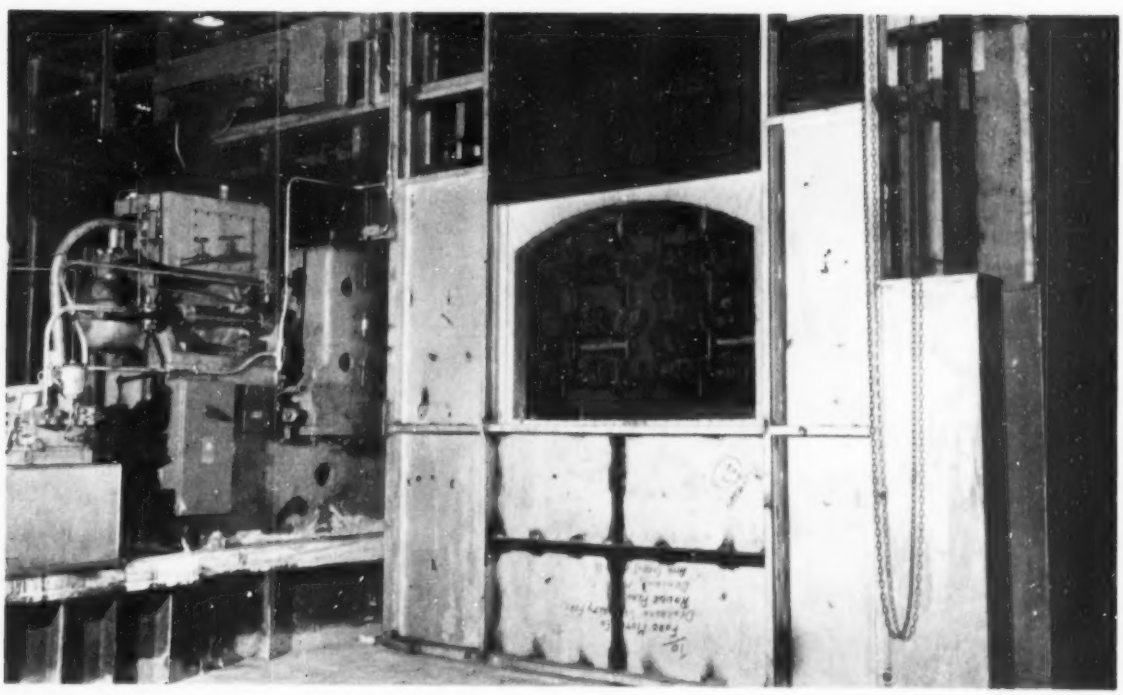
separated plating facilities work under ideal conditions

A modern horizontal barrel plating system is installed in a separate building with high walls and ceiling that provide adequate light and ventilation, and permit operating service equipment at any time. Forced ventilation at all open-surface heating tanks is provided. Tanks are located on two sides of a wooden platform for in-line operations. A mechanical barrel dump loads parts into the barrels, which are progressively transported from tank to tank by overhead bridge crane. After final rinsing, the parts are dumped into a hopper, then fed by electric vibrator to a rotating dryer.



carriers transport shafts through complete heat-treatment





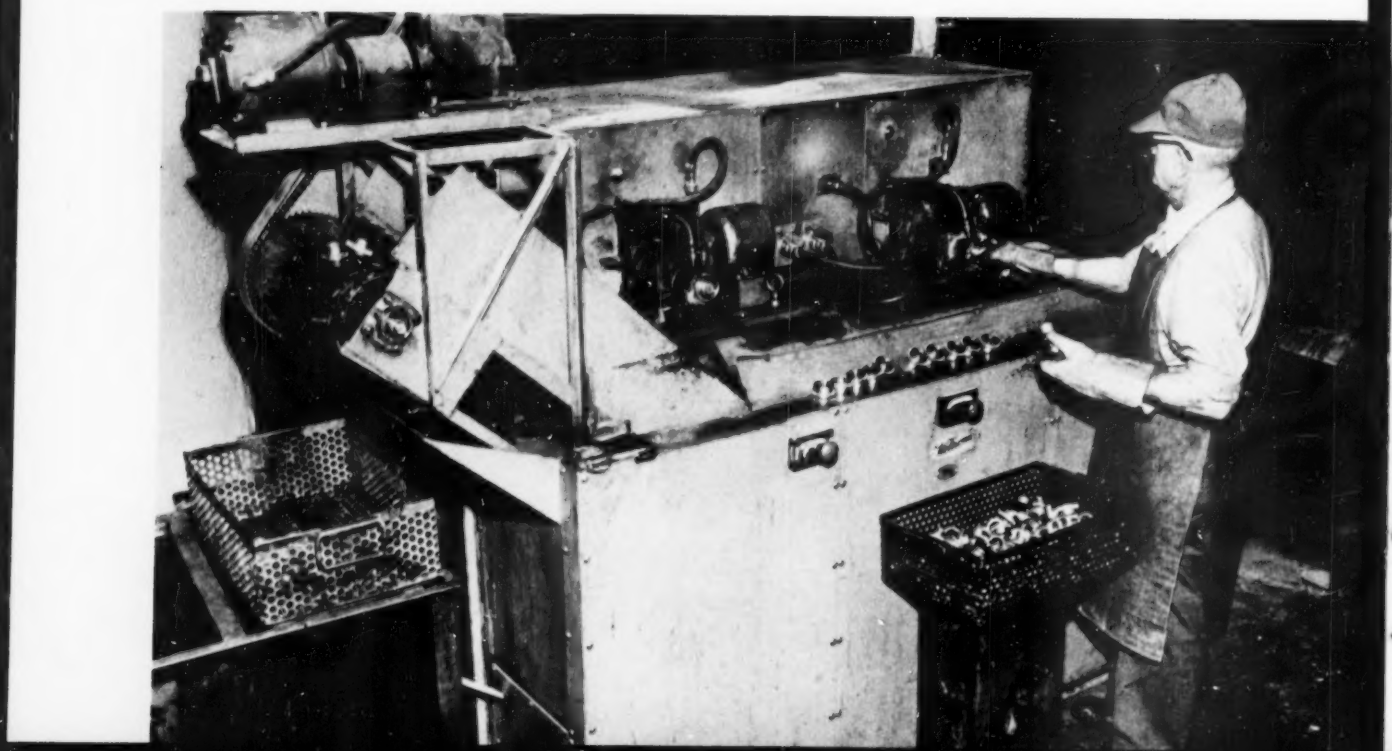
To restore proper grain structure in crankshafts after casting, annealing is required. Manual loading of the parts on trays before and after annealing, before and after stranghtening at a press, and before and after slow cooling was required in years past. Now a modern version of the heat-treatment equipment includes carriers that move the shafts through the furnaces two abreast, transports them broadside to and from the press, and takes them to a delivery conveyor.

PROCESS EQUIPMENT

TRACTOR GEARS

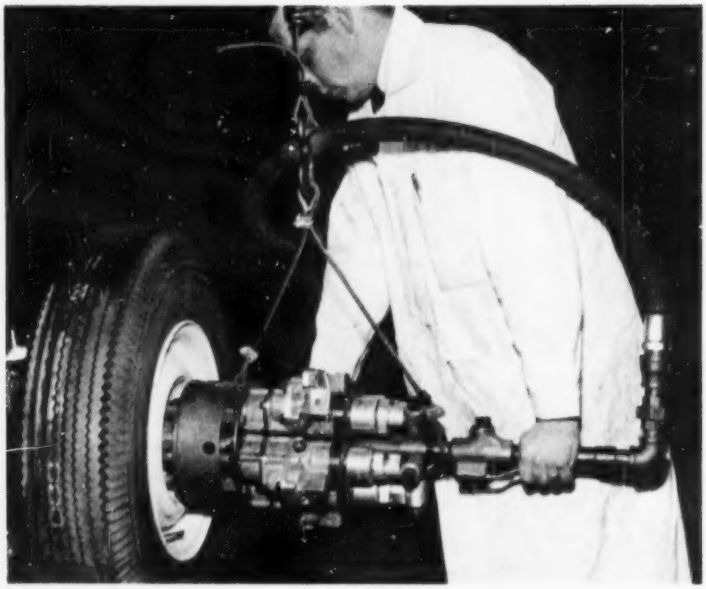
induction heater solves cyaniding problem

A comparison of the old and new methods of hardening tractor gears shows how much modern methods can improve production and working conditions. Old method was cyaniding; expensive, personally obnoxious, and poor in quality control and speed. Gears were strung on wire loops, then dipped in baths for estimated periods of time, and finally quenched by hand. The induction setup now working is much different. A two-station unit operates semi-automatically by rotating a gear on a spindle while the gear is induction-heated in a few seconds. Then the spindle retracts, dropping the gear into a quench tank from which the gear is drawn by conveyor and dropped into a basket. The operation is much cleaner, takes less floor space, and eliminates the definite problems of disposing of cyanide wastes.



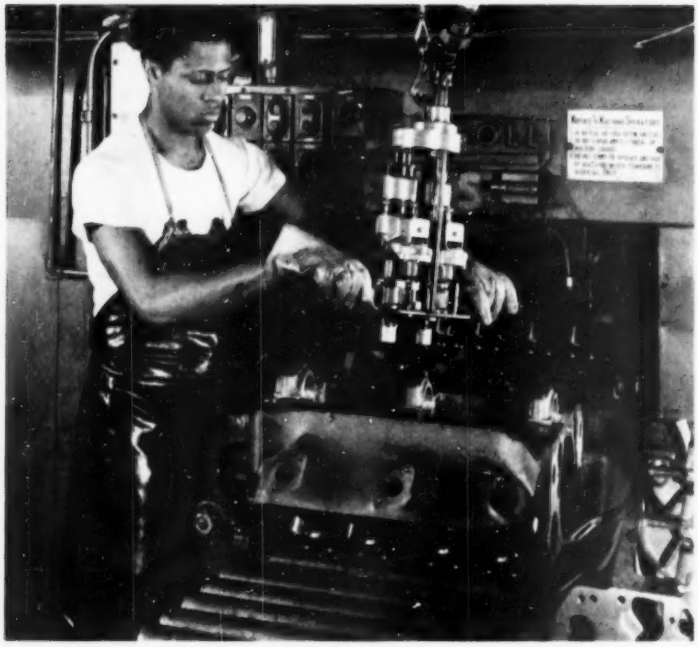
inspection turntable reduces exhausting work

Engine blocks are inspected for flaws and accuracy between machining operations on a short section of roller conveyor. Originally four men stood on the two sides of the conveyor, using air gages to check all valve holes on their respective sides. A visual check is also necessary. New fixturing at the inspection station consists of a roller turntable that allows a single operator to rotate each block to any side so he can check both banks much easier than before.



multi-spindle air tool tightens wheel nuts

To replace older methods where only one nut could be tightened at a time, and where final nut torsion depended upon operator judgment, a five-spindle air wrench has been applied. It is counter-balanced from an overhead support, which keeps operator effort low. All five spindles work at the same time, engaging the five nuts after they have been started on the wheel bolts. The wrench is automatically controlled to a predetermined final torque, insuring a better, more uniform job.

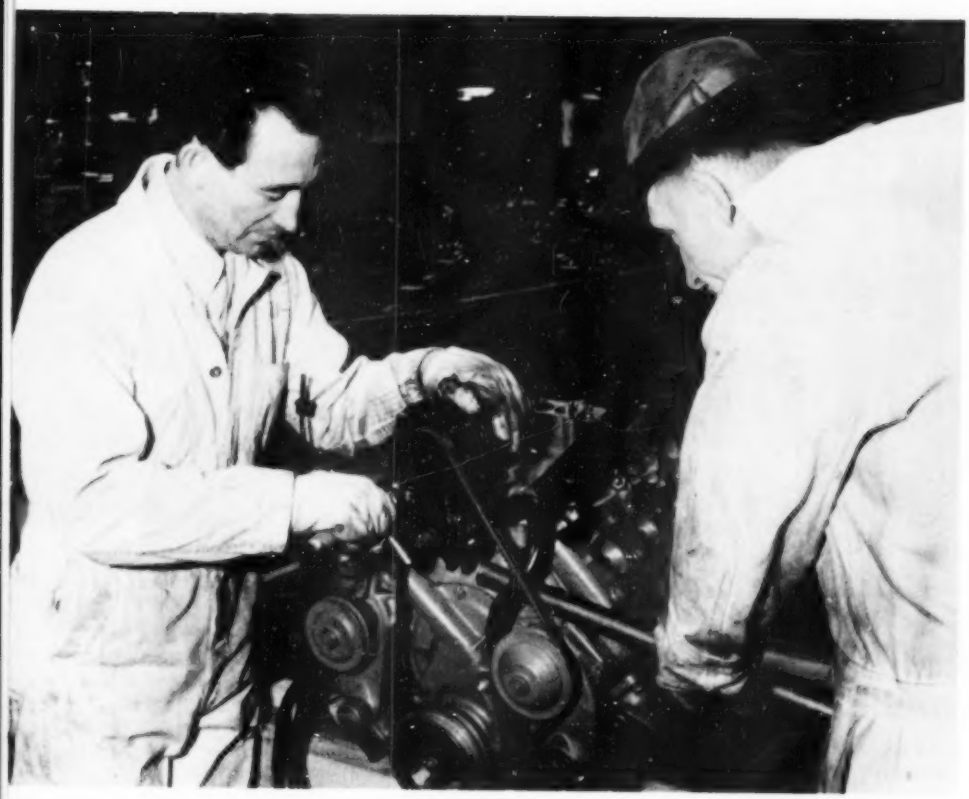


BEARING CAPS

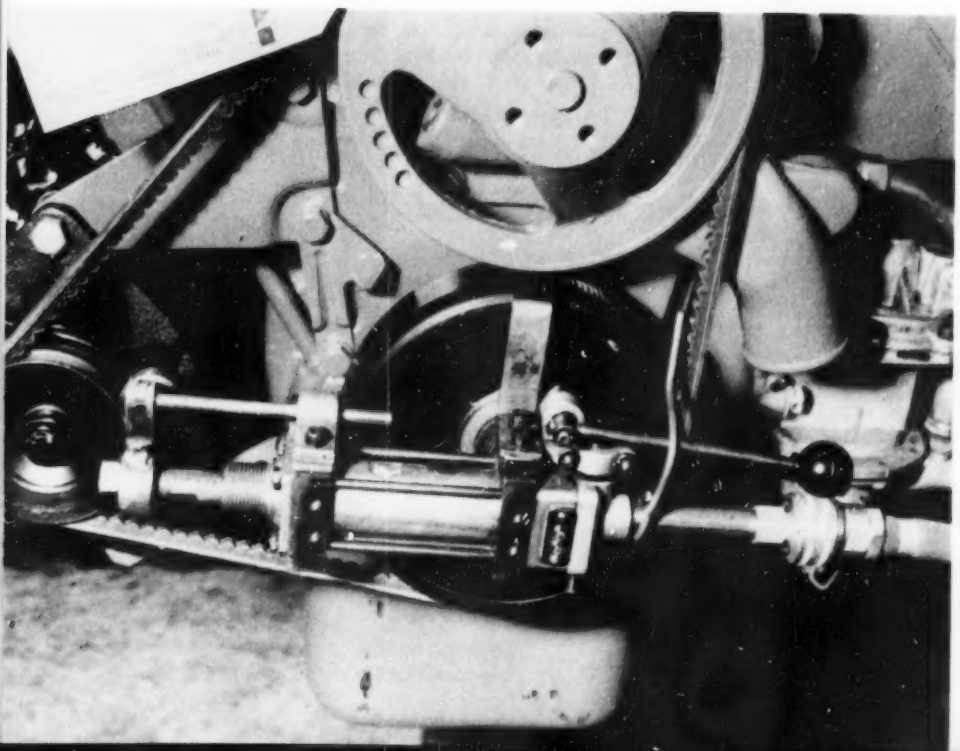
air tools beat electric for nut running

In another air-tool application, bearing-cap bolts were tightened to 95-105 ft lbs torque by operators on a production line; then hand torque wrenches were used by boring-machine operators to make the final adjustment before crankshaft holes were machined. Because electric tools with preset clutches were utilized, this double work was required for accuracy. A newly-engineered method now equips the operator with a two-spindle air wrench equipped with an air-metering device that attains final accuracy at one tightening and at a higher speed; also with one tool instead of three.

air cylinder improves accuracy of gaging belt tension

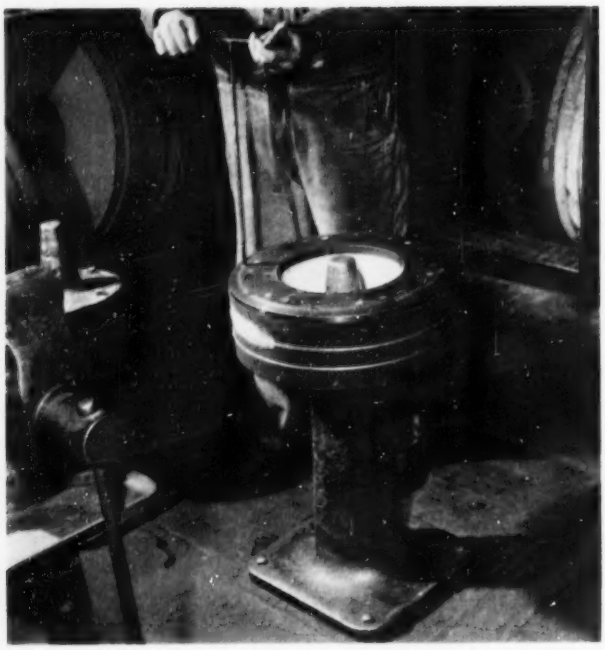


A generator is mounted on an engine by means of bolts through slots, which allow adjustment of the generator's position to take up slack in the belt. The old method of assembly was to pry up the generator when roughly bolted on, then to tighten the bolts until they held. This required two operators, and took considerable effort. Now a special air-cylinder tool is hung on the crankshaft dampener to push against the generator, eliminating any prying. The lever that actuates the cylinder can be locked by the operator, allowing him to use both hands for bolt tightening. Adjustments of the air-cylinder metering screw allow setting the tension on the belt—a matter of gaging done formerly by eye and feel.



GRINDING

PRODUCTION TOOLS



bolt-on disk-grinding wheels mount 400% faster

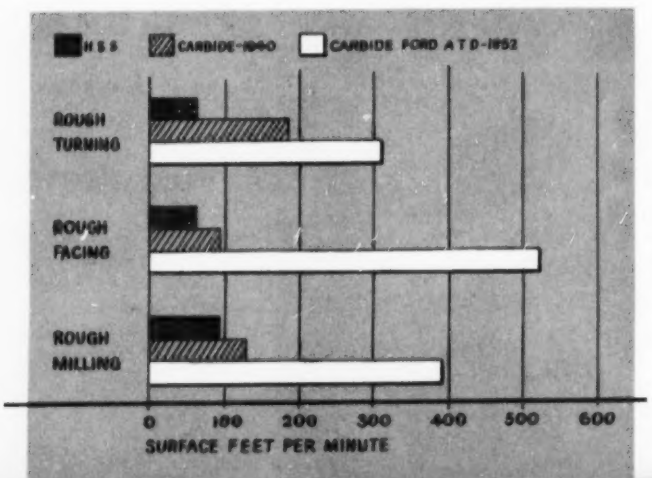
Disk-grinding machines are now being equipped with bolt-on wheels that replace the usual sulphur-bonded types. Results are excellent all the way around; mounting time is reduced 80%, the amount of usable abrasive is substantially greater, the wheels can be operated at higher speeds and with greater efficiency, they are safer, and they are well balanced.

hydraulic diamond turner increases efficiency

To prevent flats from developing on a diamond-wheel dresser, occasional operator adjustment is usually necessary. But a hydraulically operated diamond turner, installed on any grinder with a hydraulic system, does the same job automatically and more uniformly. The attachment tends to keep the diamond point better sharpened, and results in longer diamond life and more accurate dressing.

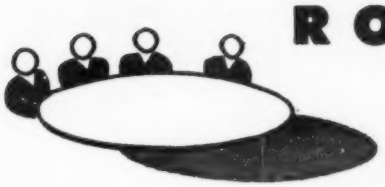
CUTTING TOOLS

performance of tool materials jumps production



Tungsten carbide was introduced to American industry in 1928, but the cost and lack of high-powered machine tools held back its wholesale adoption until the last decade. When adopted, tungsten carbide forced a number of process changes to take advantage of its cutting power. In addition, there have been many advances in the quality and performance of high-speed steels that have affected metal-cutting rates in large-volume industry, such as the automotive field. The accompanying charts show comparisons in performance—surface feet per minute—between HSS, early carbide, and present-day carbides on various production-machining jobs.

ROUND TABLE



Hotshot Fathead

"Ed, what do you do about a guy who thinks he's better than anybody else?"

"Can him, Al. Get rid of him fast."

"But he's really a hot machinist. I'd hate to lose him, but he just keeps the department in a turmoil because of his arrogance. He's superior and overbearing, and just a general pain in the neck. And yet he's really a good man as far as work's concerned."

"Now I know who you mean, Al. It's Smith, isn't it?"

"Yep. It sure is, and I'm getting a little tired of running around soothing hurt feelings after him. What can I do about him?"

"That's a tough one, Al. I know he's a good worker, and fast, too. Too bad you can't put him off in a little room all by himself. Then the only thing he could insult would be the machine."

"Yeah, but he has too much respect for machinery, Ed. That guy takes better care of his jig borer than I do of my wife. I can't fire him on account of work—the only excuse I have is that he makes trouble, and that's a tough one to prove to the personnel department."

"Hell, Al. Leave that bunch out of this. They'd just fuss around for days without doing anything about the problem."

"Sure, but how about a constructive suggestion?"

"Well, try this one: How about downgrading him just a little bit, under the pretense of getting some special order out, so he gets the idea that he isn't the greatest thing since they invented the wheel?"

"Might work, Al, but then I run the risk of getting him mad—or else he doesn't catch on and the whole plot has no effect whatsoever."

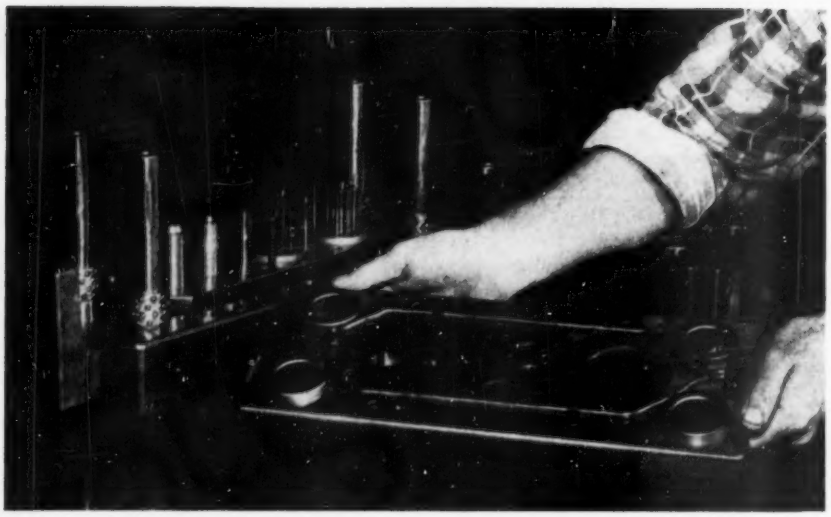
"Well, it might be worth a try. Or how about moving that pet jig borer of his over to one corner of the shop where nobody wants to work? That would give the rest of your men something to lash back at him with."

"I don't think so, Ed. That would probably get him mad enough to quit, and I need the guy."

"Okay, pick your own solution, Al. I give up. You know I had the same problem a couple of years ago. I had to can the guy, and then I suffered for a while before we got some other men trained to do special work. But at least we have peace in the family now."

"Maybe I'd better just dump him, Ed. It will play hell with my production, but maybe the other men will work harder once that source of complaint is out of here."

CAN YOU DO ANYTHING about the established know-it-all? Isn't this kind of man usually too firmly set in bad habits to ever change? Have you ever heard of a whole shop stepping lightly just to keep one man happy? Your opinions on this subject may help others in similar trouble. Discussions of earlier topics appear on later pages.



COPPER TUBING is attached to the top surface of the stripper plate and drilled with small spray holes to adapt this progressive lamination die for fog lubrication of punches shown at left. Usually 3/16-in.-OD, 1/8-in.-ID copper tubing is adequate for most dies

DIES FOG-OILED FROM STRIPPER TUBES

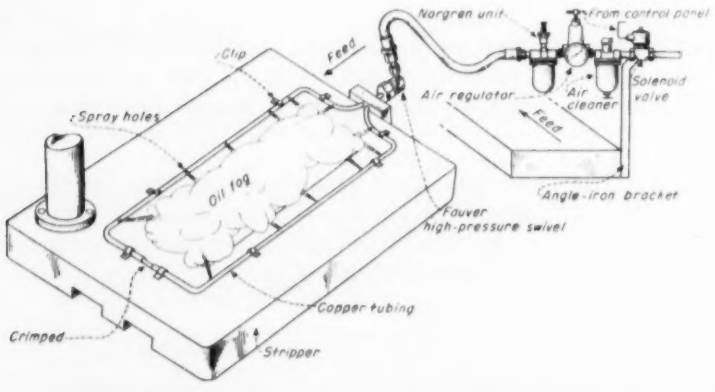
By ARTHUR E CHAMBERS, EGLINTON CARBIDE PRODUCTS, INC

Proper lubrication of punch-press dies long has been a trying problem, particularly for plants producing large quantities of stampings from tough or abrasive materials. Methods used have ranged from manual application of heavy oils or greases with brushes or swabs to roller coating or spraying lubricating oil from apparatus mounted on press frames.

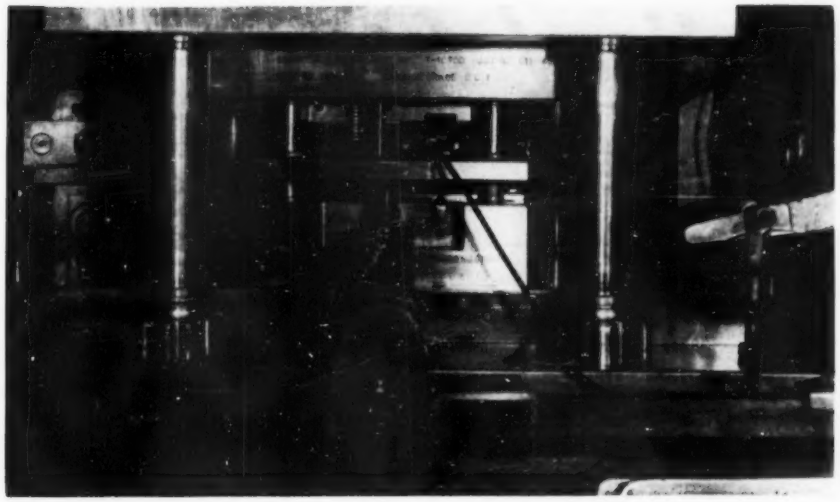
Most methods involve excessive amounts of expensive lubricants, because usually the entire sheet or strip being fed to the die is coated to insure lubricant to punch and die surfaces. In many cases, lubricant left on ejected parts is objectionable, and must be removed by cleaning or degreasing.

This is particularly true where lubricating oil forms a carbon deposit on lamination stock detrimental to electrical properties. Therefore, rather than resort to a degreasing operation, many makers of laminations prefer to operate dies without lubrication and accept the excessive punch and die wear.

Regardless of the amount of lubricant applied to the material, lubrication is useful and necessary only on the portions of the punch and die subject to wear. Eglinton Carbide Products, Inc, has therefore developed a simple method for applying a thin film of lubricant to the punches only. This film is partially transferred to the edge of the material as it is perforated, and this in turn serves to lubricate wear surfaces of the die. The system is equally applicable whether there is one punch, as in a simple piercing or blanking die, or a number of punches, as in a progressive die. It is better suited for piercing and blanking dies than for drawing and forming dies, where some other



CONVENTIONAL AIR-LINE CLEANING and lubricating devices controlled by a solenoid valve feed oil-laden air to copper tubes on stripper through flexible hose and swivel joint. Coupling between swivel joint and stripper permits easy interchange of die assemblies using the same lubrication apparatus. Pressure regulator can be adjusted between 20 and 40 psi to control amount of fog produced



TAKEN WHILE Henry & Wright die-ing machine was in operation, this photograph of a fog-lubricated progressive lamination die shows that the oily mist is confined to the area immediately above the stripper. Fog system works expecially well with carbide dies

Life of punches in progressive lamination-blanking dies has been multiplied several times by easily applied lubrication system which does not fog area or stay on parts

method would be necessary for delivering lubricant to die surfaces shielded from the lubricant by the workpieces.

In this arrangement, the punches move in a light fog of cutting oil sprayed from small holes drilled in ⅛-in.-ID copper tubes attached with clips to the top surface of the die stripper plate and arranged to surround the punches (sketch).

When blanking small transformer and motor laminations from coiled strips of silicon-steel lamination stock, Shell Grade L-23 Pella cutting oil provides adequate lubrication without leaving a detrimental film on blanked pieces. About one pint of this light oil is sufficient for 8-hr continuous use of the lamination blanking die shown, and for other dies of similar size.

EQUIPMENT

The fog-producing apparatus consists of a succession of conventional Norgren air-line units—an air cleaner, a pressure regulator, and a No. 745B-2 Lubro-Control unit—connected in series with a Minneapolis - Honeywell Type V437AICG2 solenoid valve controlling flow of air to the press. These units are supported by a bracket bolted to the press frame in a convenient location.

A 36-in. long piece of ¼-in. ID medium-pressure Neoprene synthetic-rubber hose connects the Lubro-Control unit to the stripper to deliver oil-laden air to the copper tubes. Connection to the stripper is made through a Fauver No. 9400 high-pressure right-angle swivel joint to minimize flexing of the synthetic hose that would reduce its life.

The loop of copper tubing on the stripper plate is crimped at the point furthest from the swivel joint, so the effect is the same as would be obtained if separate closed-end tubes were used. Spray holes are drilled in the copper tubing on the side adjacent to the punches. These holes increase in size from 3/64- to 1/16-in. dia as they are located further away from the feed line, so a uniform fog will be distributed about the punches despite pressure drop which occurs in the branches.

The solenoid valve preferably is connected to the control circuit of the electric clutch of the press, or the press drive motor when a mechanical clutch is used, so the fog lubricator automatically will be turned on when the press is operating.

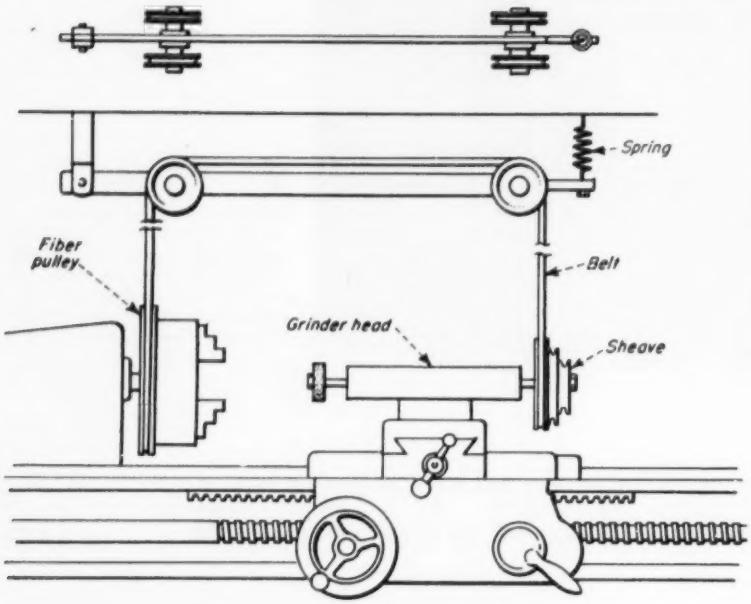
NO FOG OUTSIDE

The fog or mist produced when the press is operating is confined to the area between the punch and die when the pressure regulator in the air line is adjusted properly—usually 20 psi pressure is sufficient. Ventilation has not been found necessary on any installation.

OIL VOLATILIZES

It has been claimed that the oil fog clings only to moving parts. This is borne out by the fact that oil does not accumulate on the stationary die and the blanked stampings have only a thin film of oil on their edges. This facilitates stacking of the stampings, and the light oil normally volatilizes quickly, leaving clean banks that do not require degreasing.

Practical Ideas



Overhead Belt Drives Grinder From Lathe Spindle Pulley

In our job shop there are several toolpost grinders for the small lathes but we occasionally need a grinder on the larger lathes. To accomplish this, the setup shown was made with a ball-bearing spindle clamped to the carriage, a drive pulley on the lathe chuck, and two sets of pulleys overhead. The drive pulley was turned from laminated plastic and fastened to the chuck with small setscrews. To maintain a steady pull on the belt, the ball-bearing pulleys overhead are spring-loaded.

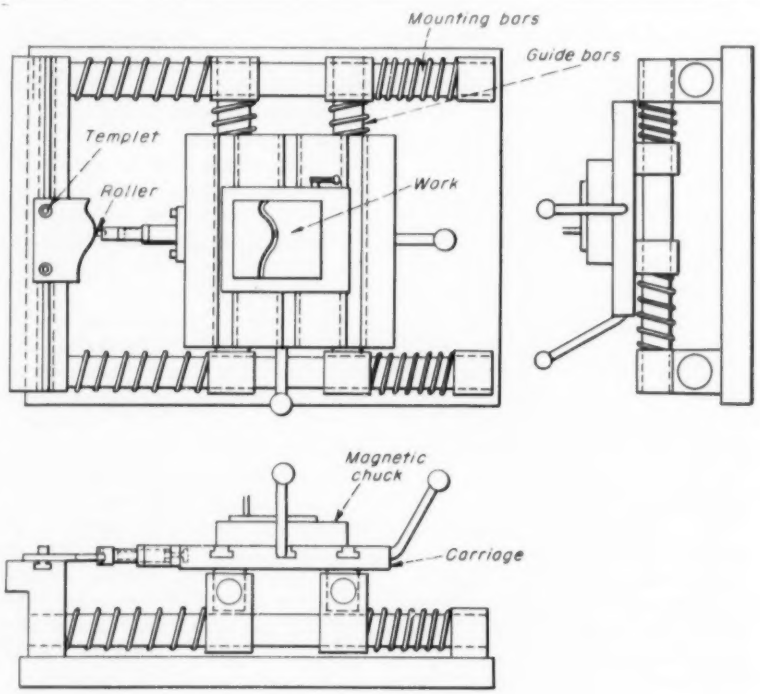
Round leather belting is used and all of the pulleys are grooved for size "C" belts. Thus, the belt stays in place despite the change in driving angle at the grinding spindle pulley as the carriage moves along the lathe bed. *George Koslow, Bronx, NY*

Sponge rubber diaphragms can be blanked with a die in a punch press or on an arbor by simply freezing the rubber in "dry ice" and alcohol until it is solid, then passing it through the die. It can also be machined in this condition. Upon thawing, the rubber will be clean cut and true to size. *John Bilobran, Parma, Ohio*

Contour-Milling Fixture for Irregular Shapes

Utilizes a spring-loaded fixture having a self-contained templet. This fixture mounts on a magnetic chuck, and the chuck is clamped to the carriage, which slides on cylindrical guide bars which are mounted in blocks. These blocks slide on rods, so that the carriage can move in two directions. Templet is adjustable anywhere in slots.

Springs hold the roller against the templet and, as the operator pushes the work along its carriage, the cutter produces the desired form. Springs are provided to take out vibration and to steady the movement of the work. *Victor Gabriel, Eva Peron, Argentina*



Gages Control Tierod Tension, Eliminate Overloading On Setup

We have a large press department with several C-frame presses, on which we often use tierods. Formerly, we never knew that the rods were exactly as tight as they should be. Now, we have a gaging method which is quick and quite accurate. Our general practice is to tighten the rods to a total of 20-25% of rated tonnage. Thus, on a 40-ton press, each of the two rods would have about a 5-ton load. To determine the tension in the bars, we measure the actual elongation in the rods.

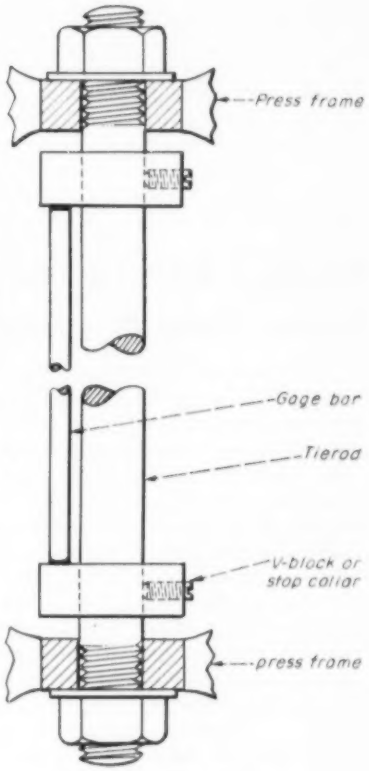
To gage this tierod tension, we made up a set of bars from ½-in.-dia stock, in lengths of 3, 4, 5, and 6 ft, and ground the ends of these rods square. The exact length is not critical, and may be as much as ⅛ in. off without hurting anything.

To set up a press of, say, 40-tons capacity, put in the proper bars (1½-in. dia, in this case), and tighten up the nuts enough to seat them firmly, but without any real pressure on them. Now, clamp a set of V-blocks on each bar, as shown, so that the gage rod just fits between the blocks. (Shaft collars with setscrews would do as well.)

We have calculated the elongation of various diameter bars, as shown in the table.

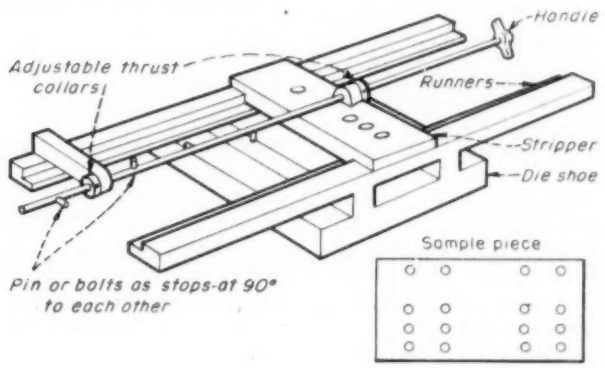
Because the bar is 1½-in. in dia, and the gage rod for this press is 3 ft long, and we want 5 tons tension in the tierods, we can calculate from the table (below) what elongation is needed for proper setup. In this case it is 3 x 0.00045 in. per ton, or a total of 0.0068 in. Therefore, we tighten each nut gradually until we can fit a 0.007-in. shim between the gage bar and the V-block, and we know we have approximately the correct tension in the tierods. *Henry George, Bronx, NY*

(*Ed:* By leaving one end of the gage bar free, and clamping the other end, a 0.0001-in. dial indicator can be mounted on the free end of the gage bar, and zeroed on the V-block. Thus a more accurate reading can be taken.)

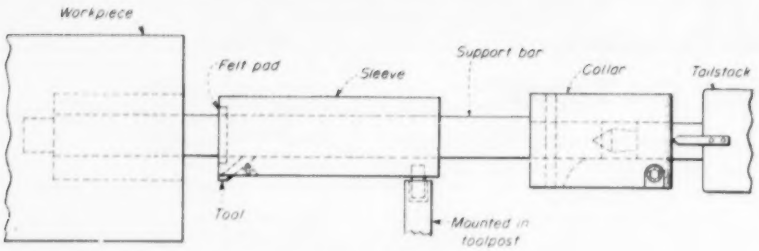


Bar Dia (in.)	Cross-section area (sq in.)	Elongation/ft/ton (in.)
1	0.785	0.000810
1¼	1.23	0.000650
1½	1.77	0.000450
1¾	2.41	0.000330
2	3.14	0.000250
2¼	3.98	0.000200
2½	4.91	0.000160

Simple Gage for Multiple Die Setup



When simplicity of the job does not call for elaborate gaging of positions on multiple station dies, this inexpensive gage will serve the purpose. Four sets of identical holes were required at different intervals. The gage to space the holes was made from crs rod, and four stops were fastened to the rod at 90° intervals. Two bushings, one on the stripper, the other on the runner-mounted bracket, support the rod, and two adjustable thrust collars locate the position of the work-stop. *Earl Jahnke, Elmhurst, Ill*



Piloted Boring Tool Bores Hole 8½ Diameters Deep

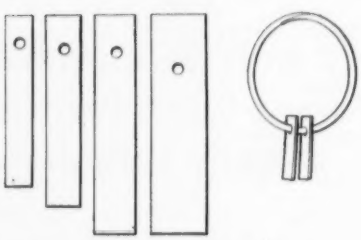
This job called for boring a deep blind hole in a number of castings. Because the hole was 8½ diameters deep, an ordinary boring bar would deflect more than was permissible. Therefore, the special boring-tool-holder was made up.

Because the hole was cored, it was possible to centerdrill and then drill and ream a short hole at the bottom of the blind hole in the casting. Then the tool-holder shown was inserted into the hole and boring proceeded easily.

The tool-holder consists of a main support bar, which was a round bar with two matching eccentric sections, one on either end of the main support bar, and spaced in line with each other. The center section of the bar carries a sliding sleeve, on which the boring tool rides. (A felt pad is placed in a recess of the end of the main support section, to keep chips out of the sliding section of the bar.)

A short pin is pressed into a hole in the side of the sleeve, and this pin is fitted into a slotted hole in a piece of stock mounted in the toolpost. A collar is mounted on the back end of the eccentric section, pinned onto the bar, and slotted so that it can be clamped to the tailstock spindle. A convenient number of graduations are marked on this collar, to measure the amount of movement of the tool as the collar is turned.

To operate the fixture, slip the front end of the toolholder into the hole reamed at the bottom of the cored hole in the work, and support the rear of the holder on the tailstock center. The block is mounted in the toolpost, and fed in over the pin in the sliding sleeve. The graduated collar is rotated until the tool contacts the work. The regular longitudinal feed moves the tool into the work and through the length of the bored hole. After the first cut, the tool is backed out, and the collar rotated a few divisions, and another cut is taken. Because of the nature of an eccentric, the feed-in of the tool is not linear with the numbers on the collar, but with a little experience, an operator can learn how far the tool moves at different positions of the scale. *H A Koslow, Bronx, N Y*



Standardize Tool Packing

Packing, to raise tools to the centerline of the lathe spindle, is usually a casual rummaging around in the toolbox to find whatever is handy. This practice often results in improper tool setup.

One way to avoid the trouble is to standardize on a set of tool packings, made up by the thousand (cheaper), in thicknesses from 0.005 in. to ⅛ in. or more, to suit the needs of the department. Each thickness can be a particular size, to aid in selection, and can be finished in a different color, such as cadmium plate, bluing, or copper plate. Then, if rings are made up out of spring-steel, bent to resemble a large key-ring, and finished in the characteristic color of the strip to be held, the packings can be put by the machines. *N Palmer, Paddington, Australia*

Special Turret-Tool Saves Handling and Machinery

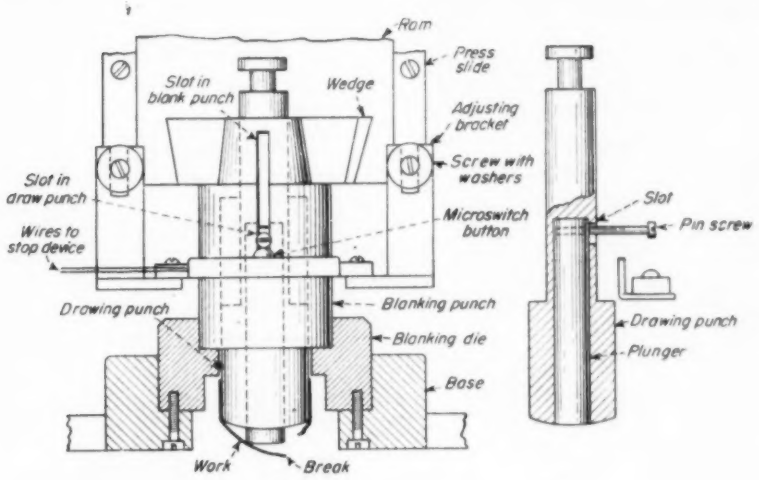
The last operation on some small shafts consists of pressing or staking a brass gear or pulley onto the shaft. This job is usually done on a small press.

If the completed shaft, before joining the two parts, is held in a turret lathe, the last station of the turret can be equipped to handle the pressing operation. The turret station should hold a round bar, on the other end of which has been pressed a ball bearing. The outside of the ball bearing is press-fitted into the rear recess of an adapter, the front of which is bored out to fit the part being pressed onto the shaft.

When the shaft is completed, the ball-bearing fixture is indexed into place, and the gear or shaft is placed in the front recess of the fixture. The bearing allows the gear to rotate with the shaft as it is pressed on.

The collet must be set tight, or, if the shaft is in a second-operation setup, a stop can be placed in the spindle to absorb the thrust. *R C Hoard, El Paso, Texas*

When matching stagger-tooth milling cutters, and there's no micrometer handy that's large enough to measure them, sharpen the cutters together on an arbor. Final grind is taken on both cutters without changing the grinder setting. *O F Lambert, Springfield, Ohio*

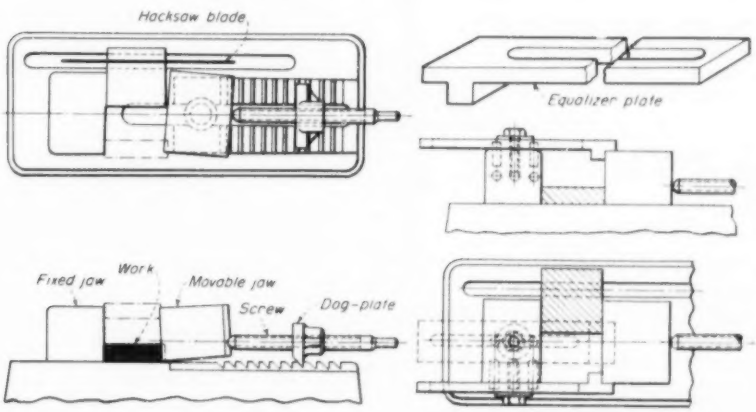


Tripping Mechanism Stops Blanking Punch

Illustrated is an internal feeler-plunger, incorporated in the main plunger of a blanking punch and dieset which, detecting a rupture or distortion of the work, lowers a pinscrew down a slot, which contacts a microswitch. This switch operates an electromagnetic clutch and stops the press before broken shells of the work can pile up and break the die.

On the upstroke of the ram the parts resume the original position.

As long as the second plunger rests on the metal or on a good shell the open circuit microswitch is inert and the work can be continuously fed. *B Menkin, Bronx, NY*

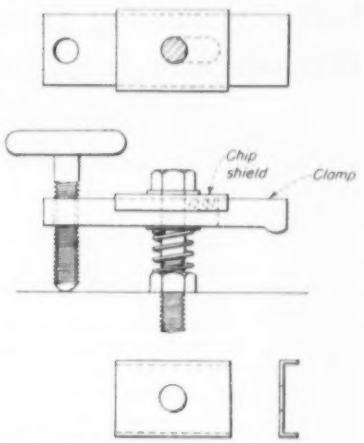


Thrust Equalizer Replaces Packing In Power-Saw, Milling Machine Vises

In some hacksaw vises, several common troubles occur when gripping short or thin pieces for sawing. If the piece does not cross both the horizontal and vertical axes of the movable jaw, there will be some tendency to tilt the movable jaw. The usual way around this trouble is to hunt up a piece of packing from the scrap pieces around the machine, which may or may not be successful, depending on how much scrap is handy.

The device shown is suggested to avoid this trouble. It consists of an easily made equalizer plate which can be bolted onto the side of the movable jaw, when cutting short work, or the top of the movable jaw, for thin work.

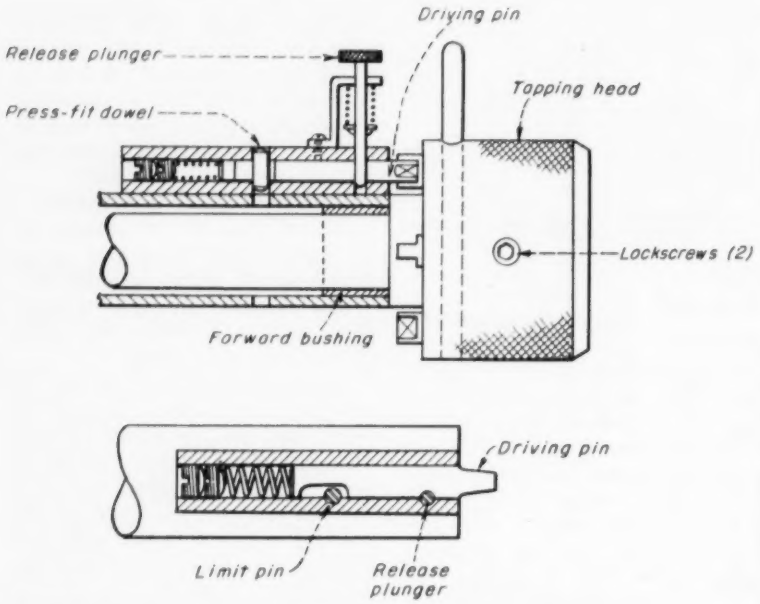
To operate the equalizer, set the movable jaw lightly against the work, and set the equalizer step against the appropriate side of the jaw, clamping the plate with the nut and lock washer. Then tighten the jaw to grip both the work and the equalizer plate. *W M Halliday, Lancashire, England*



Chip Shield Protects Clamp

When using a clamp as shown, the problem of chip-clogging frequently makes clamp operation difficult. Chips tend to lodge between the slot and the clamp retaining screw.

To cure the situation, a simple shield can be provided, overlapping the clamp on each side to maintain correct alignment. Sheet steel 1/32-in. thick makes ideal material for this shield. With this shield installed, chips cannot fall through the slot in the clamp and are readily brushed off. Shields can be left on the clamps. *F C Elmo, Dayton, Ohio*



Self-Releasing Tapping Head Withdrawn from Lathe Work Easily

This self-releasing tapping head is easily withdrawn from the work without releasing the stops on the lathe or drillpress to which it is applied.

Tapping is begun with the flattened pin in the tapping head, engaged with the flattened driving pin in the tool body. After the head has moved forward to the extent allowed by the turret stop, the tapping head continue to move until driving pins disengage, allowing the head to turn freely on the bronze bushings.

With spindle stopped, the lock pin is raised by hand, allowing the spring-loaded driving pin to shoot forward, re-engaging the driving pins for backing the tap out of the work.

When the tap is again engaged in the work, the spring-loaded driving pin automatically returns to its original position because of the pressure of the tapping head. Spring-loaded plunger locks the driving pin in place until released by hand for backing out the tap. *Norman Feinberg, Charleston, S C*

Foot-Switch Makes Drillpresses Safer

Connecting a foot-switch in series with the regular machine switch makes drillpresses much safer to operate. In case the drill jams or picks up the work when breakthrough occurs, the operator simply lifts his foot from the switch, and the spindle stops. Normally the machine will not run unless the foot-switch is actuated.

This device is also useful when operating the drillpress with a fly-cutter or circular-hole-saw, because of the possibility of injury from breakage of the part or cutter. Also, when loading and unloading parts in a production run, when it is unsafe to load with the spindle running, it is simpler for the operator to stop the machine.

Another advantage from a foot-switch is that in some drillpress jobs, such as countersinking, the spindle runs too fast, and chatter-marks result. Many mechanics avoid this problem by jogging the spindle. The foot-switch makes jogging much easier. *Henry George, Bronx, NY*

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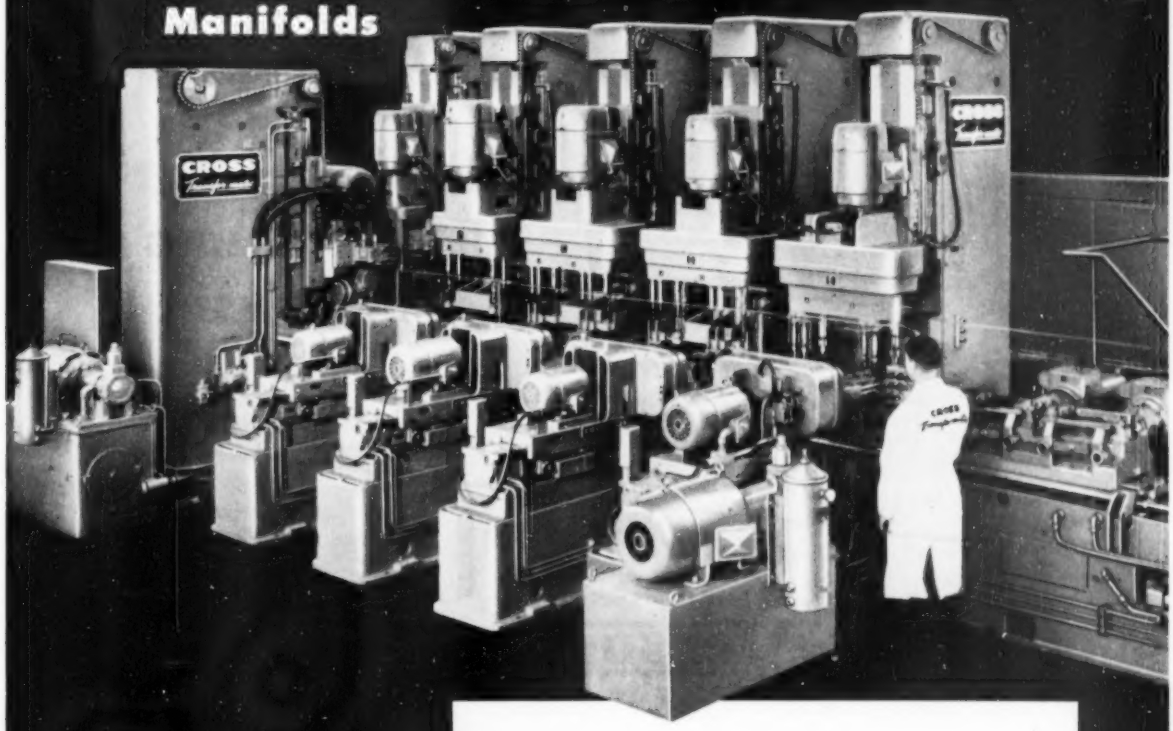

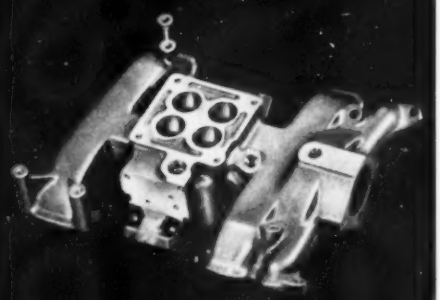

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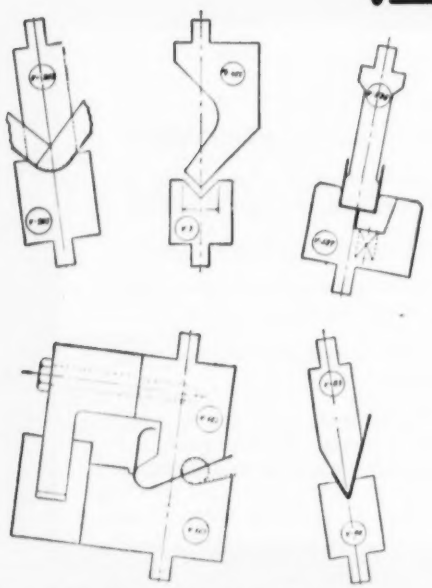

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Hole Extruding Punches...I

BY PETER BALSELLS, Tool Engineer

Piercing and extruding of sheet metal may be accomplished in one step by using a single punch. By the use of this method the piercing operation takes place without the use of a die to support the piercing operation. Instead, the stock must be supported firmly during the piercing operation to avoid breaking the tip of the punch. The stock is usually held firmly by spring pressure.

Of the first three designs illustrated, the first two are the most widely used, because a good ex-

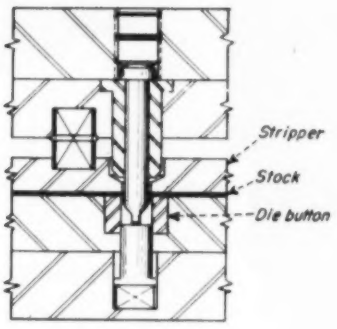

Fig. 1

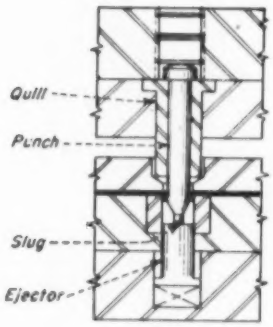

Fig. 2

FIGS. 1 AND 2 . . . Good extrusions are obtained by these tool designs, because the piercing and extruding punch is properly supported in a quill, and the stock is supported during piercing. To obtain a good extrusion, however, the proper relationship must exist between diameters B and C of the punch, or early failure may occur

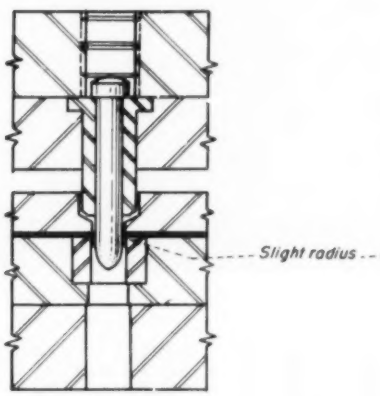

Fig. 3

FIG. 3 . . . A ragged extrusion is produced if the stock is not supported during piercing

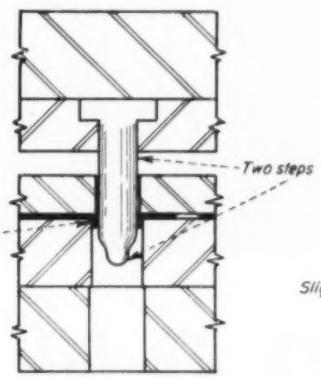

Fig. 4

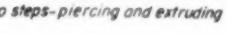

FIG. 4 . . . Two-step operation, piercing first, followed by extrusion, improves punch life

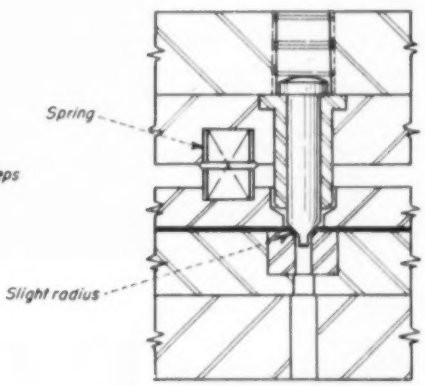

Fig. 5

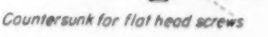

FIG. 5 . . . Extrusions for flat-head screws are often needed, and are made in this tool

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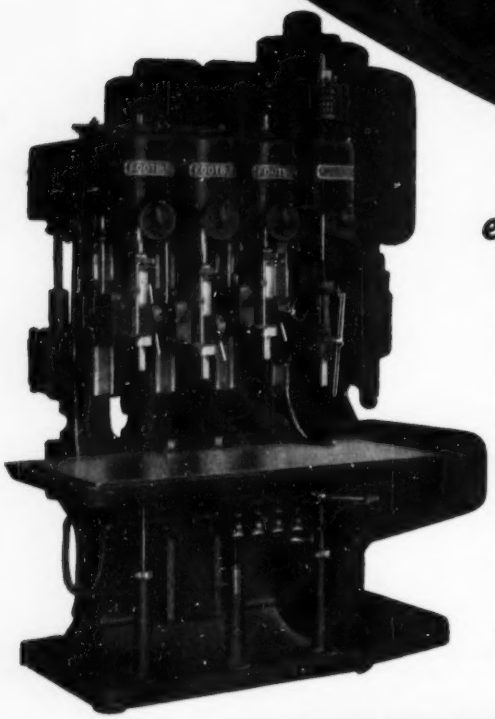

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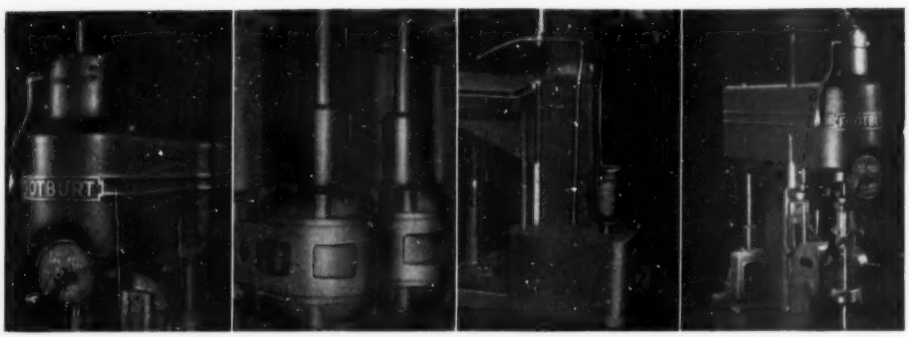

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MACHINE TOOLS

Hole Extruding Punches...II

trusion is obtained. In the third method the stock is not pierced, but it is forced downward by the punch. By using this method a ragged finish is usually obtained.

To obtain a good extrusion, the proper relationship must exist between diameters B and C of the punch. If a long extrusion is desired, the diameter C in the punch may be decreased. However, a ragged extrusion will probably be obtained. Besides, the tip of the punch may be too weak to perform the job properly.

Whenever possible, piercing and extruding punches should be supported properly by quills, to avoid early breakage. Both the punch and the die button should be made of high-speed steel to withstand friction.

It is difficult to give a definite formula to obtain the desired extrusion, because of many variables. As a rule most small extrusions are developed in the toolroom. However, tabulated are some of the most common extrusions used for tapping purposes. Dimensions were taken from actual practice.

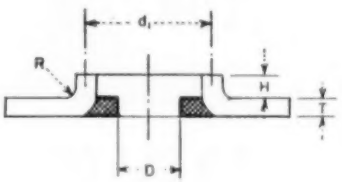
When more than one die is used to make a piece, it may be advantageous to accomplish the extrusion operation in two steps: piercing and extruding later. By using two operations the punches usually last longer, because stresses are reduced to a minimum.

Another type of extrusion is used for flat-head screws. The extrusion makes room to place the head of the screw. As a rule when this type of extrusion is to be made, dimensions are not given, and it is up to the toolroom to develop the extrusion according to specifications.

FORMULAS FOR EXTRUSIONS

If the metal in the hub is not thinned out to any extent, this formula has been suggested:

$$D = \sqrt{d_1^2 - 4d_1 H}$$

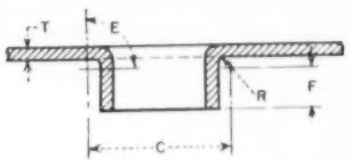


Generally speaking, this formula is not practical in application.

An approximate formula for developing extrusions is:

$$\text{Piercing size} = C - 2\,(F + E)$$

$$E = 1.571\,(0.3T + R)$$



These formulas leave much to be desired, and the toolroom should finally determine punch dimensions, to avoid trouble.

DIMENSIONS OF EXTRUSIONS FOR TAPPING PURPOSES, AS TAKEN FROM ACTUAL EXAMPLES

Tap Size	A	B	C	D	Stock
10-24	0.478	0.150	0.075	0.0459	Enam Iron
10-32	0.0598	0.161	0.087	0.0339	Steel
1/4-28	0.0673	0.218	0.095	0.0264	Steel
10-32	0.0478	0.164	0.093	0.0625	Steel
10-32	0.0897	0.161	0.090	0.0625	Steel
6-32	0.050	0.1065	0.0625	0.0625	Aluminum
8-32	0.050	0.126	0.080	0.0937	Brass
8-32	0.091	0.135	0.182	0.0625	Aluminum
5/16-18	0.1196	0.260	0.150	0.250	Steel
12-24	0.0598	0.179	0.071	0.0625	Steel
3/8-16	0.1196	0.328	0.216	0.0532	Steel
6-32	0.032	0.110	0.062	0.0625	Steel

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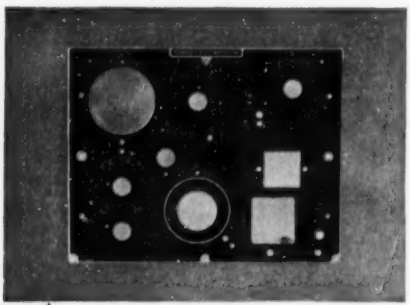

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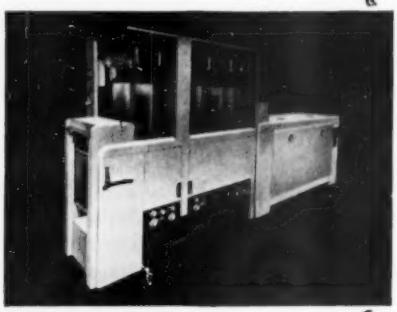

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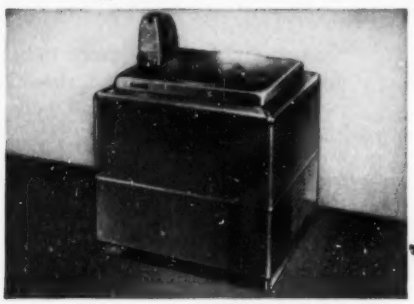

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How to Work Tellurium Copper

BY HENRY ASHLEY, Metallurgical Engineer,
CHASE BRASS AND COPPER CO, Waterbury, Conn

Outstanding characteristic of tellurium-copper alloy is its combination of excellent machinability and high electrical conductivity. Machinability is only 10% below that of free-cutting brass; conductivity only 10% below that of pure copper.

As normally supplied, the alloy consists of 99.5% Cu, 0.5% Te. The tellurium does not go into solution in the copper, but remains distributed as a copper telluride through the material in much the same manner as the lead in free-cutting leaded brass. The copper telluride particles, however, are considerably more abrasive than lead. Hence, carbide-tipped tools are generally recommended.

ELECTRICAL CONTACT PINS and terminals, welding torch tips, and soldering coppers have been the biggest fields, but the possibilities for use of tellurium copper are almost limitless

TURNING, DRILLING, THREADING

Cutting speeds should normally be between 200 and 450 fpm. For single-point tools, a back rake of 8 to 10°, a side rake of 6 to 8°, and a 10 to 12° clearance have been found satisfactory for most work. Cutting fluid should be employed, and almost any light (100 sec) cutting oil will serve. Light mineral oil with 5 to 10% lard oil will give excellent finish, accuracy and tool life. For heavy cutting, where cooling is of major importance, soluble oil mixed 1:10 or 1:20 will serve well.

For drilling, use standard brass drills with narrow lands and polished flutes, and apply a steady stream of light cutting oil. On larger holes, a single-lip drill may work better. Maintain a constant feed, and back off after drilling three diameters for the first cut, followed by successive backoffs.

HOT AND COLD WORKING

Tellurium copper may be extensively hot worked, because tellurium has no adverse effects on the hot-working properties of copper. This is an important advantage over leaded copper, because even small amounts of lead seriously decrease hot-working characteristics. Best results are obtained by working at 1400 to 1600 F.

The alloy may also be extensively cold worked, although it is somewhat less ductile than pure copper at room temperature. If work hardened, it can be annealed at 800 to 1200 F and either air-cooled or quenched.

For joining, soft soldering gives excellent results, and silver brazing may also be employed. Both carbon arc and oxyacetylene welding may be employed, although the material is rated as only fair for these methods. Resistance welding, either spot or seam, is not recommended.

APPLICATIONS

Because of its excellent thermal and electrical conductivity, the alloy finds extensive use in electrical connectors, motor and switch parts, and as soldering coppers. In the latter service it is preferable to copper as it does not oxidize so readily.

For applications involving moderate forming, such as staking or knurling, use half-hard temper with tensile strength approximately 42,000 psi, yield strength about 39,000 psi at 0.5 % extension. For maximum hardness, strength or stiffness, use hard temper, with tensile strength about 50,000 psi, yield strength 46,000 psi.

Watch Your Tooling, *says Stainless Sam*

PART: Cone-shaped piece used in poppet valve of M-1 rifle. Made of ½-inch diameter Type 416 stainless bar stock.

OPERATION: Rough- and finish-form and cut-off.

EQUIPMENT: B. & S. Automatic.

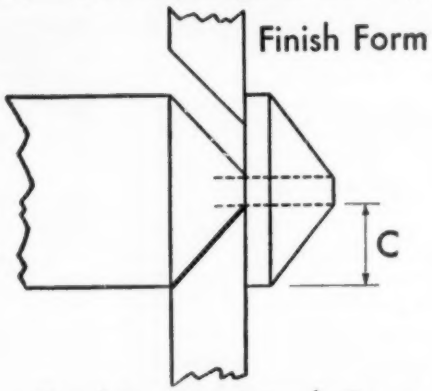
PROBLEM: To obtain satisfactory finish on conical section and cut-off side.

ORIGINAL SET-UP: The original set-up shown in Sketch A employed a combination rough-form and cut-off tool used successfully on non-ferrous metals. This tool will not work well on stainless steels. It builds up too much heat and pressure, gives a poor finish and requires frequent resharpening.

HERE'S HOW STAINLESS SAM SOLVED THIS PROBLEM: Stainless Sam discarded the tool (Sketch A) that cut-off and rough-formed at the same time. In its place he used a single tool that did the job in two successive operations (Sketch B). The time cycle was increased slightly by the longer stroke (C) required for two operations, but finish of both the flat and conical section was improved greatly. Tool life was no longer a problem.

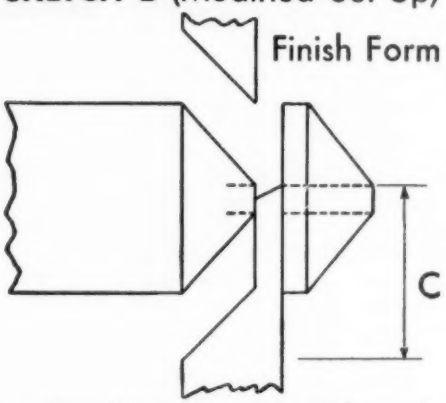
ASK FOR STAINLESS SAM'S BOOK: There's complete information for you in the booklet, "Machining of Armco Stainless Steels." You'll find recommended cutting speeds for all standard types of stainless steels, feeds, tool compositions and a wealth of information on tooling. Write us or ask your Armco Distributor for this booklet. Remember he has a stock of Armco Stainless Steel bars ready for quick delivery to you.

SKETCH A (Original Set-Up)



Combination Rough Form and Cut-Off Tool

SKETCH B (Modified Set-Up)



Combination Cut-Off and Rough Form Tool

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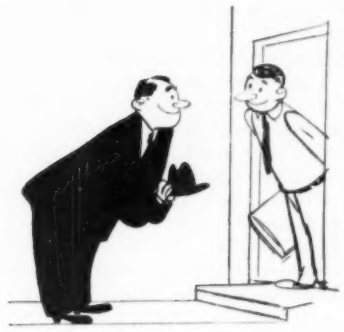


Good Neighbor

RELIANCE ELECTRIC & Engrg Co, Cleveland, built a new plant in Euclid, Ohio (pop 41,000), in 1951. Initially, owners of adjacent houses raised a real fuss; theirs were relatively new middle-class houses, and they hadn't known adjacent land was zoned for factory building. Instead of battling onto the 62-acre site, Reliance held a series of meetings with home owners, had them tour the Cleveland plant, then made many changes in plans. A 3½-acre "buffer zone" of grass and trees went in between plant and homes. Manufacturing operations were moved to the side of the plant away from homes. The roadway into the plant was moved 54 ft farther away, the plant itself moved 150 ft farther away, and plans changed so additions would be made on the far side. Some 20 homes now have their backyards toward the plant. This former low ground has been filled with several hundred thousand cubic yards of dirt, bushes and flowers transplanted, and a 120 X 1000-ft play area of grass, fenced off from the plant, created and maintained by the company. Cost to Reliance was only about $10,000. Neighbors say the company "bent over backwards" to be a good neighbor, and everybody is happy.

Mirror Edge

DON'T USE a lapped or superfinished carbide tool for rough cutting on steel, says Carboloy—it's a waste of manhours. Surface finish has little effect on tool life for average machining; the tool works well even if unground. The rough tool has a 30-plus mu-in. finish; if ground on SiC wheel, it's 15-plus; if diamond-ground, it's 8 to 15; lapping and superfinishing improve it to ½ to 5 mu-in. But the lapped tool fails faster than a diamond-wheel-ground one for roughing, because the lapped surface increases area of contact, raising both friction between chip and tool and the rate of heat transfer from chip to tool. But for precision finishing, at least diamond grinding is advisable—100-grit for roughing (by diamond or SiC), finishing in a duplicating grinder with 400-grit, resinoid-bonded diamond wheel. And on aluminum, magnesium, and their alloys, lapped top faces and cutting edges are a must for good tool life.

Copper-Lead Bearing

TIN RESEARCH INSTITUTE (England) has done research indicating it may soon be possible to replace copper-lead bearings with an aluminum-tin alloy containing 30% Al. The alloy has excellent anti-friction properties, is relatively cheap, can be bonded to steel strip or dural backings, and can be used with unhardened mild-steel shafts.

Horseshoes

FIFTY YEARS AGO, big news in Flint, Mich, papers was the Convention of the Michigan Master Horseshoers and steps to "elevate members to a higher standing of excellence" by appropriating $5000 for a horseshoeing college in Battle Creek. The same edition of the *Flint Journal* (Sept 10, 1903) carried an obscure item about David Buick forming Buick Motor Company. Probably the horseshoers could have their convention in a phone booth there today —where Buick is big business.

Long Shot

LATEST STATISTICS on automobile engines is $60 million for one new design. The job began in 1948, with many designs. More than 30 engines were hand-built at a cost of $25,000 each and thoroughly tested. Then, in 1950, the design was firmed and a new plant designed and ordered, including 2000 machine tools. Four broaches cost a half-million apiece, some "small" broaches $40,000 each plus $14,000 for tooling. One 158-ft transfer machine cost $600,000. But the finished plant can in one week outproduce two years of hand building, can turn out 850 cylinder heads while a machinist hand-makes one.

Watchful Waiting

OUR POLITICAL MEN are telling us to create a force which has to be in being for an indefinite time—that is, until everyone, including ourselves, puts into effect a system of foolproof enforced disarmament.

Now, I don't doubt that the American people are willing to put up the money to build and maintain enough force to carry out this policy, but I am equally sure that Americans are *not* willing to sustain a force that is wasteful in its composition or management—THOMAS K FINLETTER, speaking in Detroit.

Paintistic

PAINTING in one auto plant alone represents 27 operations on two miles of conveyors. There are 28 paint-storage tanks, each holding 120 gal., and 3600 ft of piping to booths.

Smash Hit

AN ORDER for a small-size rock crusher from a Chicago ballpark occasioned some curiosity at the manufacturer's plant. Baldwin-Lima-Hamilton Corp, in Lima, Ohio. It turned out that the park operators had a real problem in handling the empty beer cans picked up after each game. It took several trucks to cart them away because they had considerable bulk but little weight. Now they put them through the crusher and one truck can easily handle them in one load.

"Biggest and Finest" Metals Show Will Make Cleveland Mecca of Metalworking World Oct 17-23

CLEVELAND—"Biggest and finest" is the prediction for the National Metal Exposition & Congress opening here at the Municipal Auditorium October 17.

More than 450 exhibitors are scheduled to take the wraps off newest developments in all phases of metalworking and metal production equipment and methods. And the forecast is that more people will be on hand to buy more than ever before in the 35-year history of the event.

The Congress (technical program) will open October 17, two days in advance of the exposition (exhibit hall), both will continue concurrently through October 23.

Sponsoring technical societies, each of which will have a full program of its own during the Congress, are: American Society for Metals, American Welding Society; Institute of Metals Division, American Institute of Mining and Metallurgical Engineers; and Society for Non-Destructive Testing.

ASM Program

ASM will hold its annual Seminar on Saturday morning and afternoon and on Sunday morning and afternoon, October 17-18. This year's subject: "Relation of Properties to Microstructure."

ASM's October 19 sessions will cover "Titanium and Molybdenum" in the morning: "Titanium" in the afternoon. October 20 will be given over to "Mechanical Properties," "Non-Ferrous Metals," and "Physical Metallurgy." Its Annual Meeting and Campbell Lecture will be held Wednesday morning, October 21, with Donald S Clark of California Institute of Technology speaking on "Behavior of Metals Under Dynamic Loading." Following this will be a session on "Boron."

ASM's October 22 sessions will cover "Tempering," "Constitution," and "Stainless and High-Speed Steel." "Mechanical Properties" will wind up ASM's technical program Friday morning, October 23.

AWS Program

American Welding Society's technical program begins October 19 with A-Prize Awards and its Adams Lecture by R B Shepheard of Britain's Shipbuilding Conference. His subject: "Aspects of Welding Research in British Merchant Shipbuilding." Following this will be sessions on "Gouging and Cutting," "Resistance Welding," and an "Educational Lecture Series." That evening AWS will hold its President's Reception and National Officers Dinner.

October 20 sessions will cover "Stainless Steel," "Titanium," "Structural," "Aluminum and Aircraft," "Weldability" and the Educational Lecture Series. Wednesday, October 21 will be given over to "Weldability," "Titanium," "Controls and Inspection," "Pipe," "Research," "Education," and the Educational Lecture Series.

October 22's AWS program will take in "Pressure Vessels and Research," "Inert Arc Welding," and "Automatic Arc." In the afternoon, AWS's Annual Business Meeting will be held: and in the evening, its Annual Dinner. Friday, October 23, will wind up the technical program with "Applications," "Inert Arc Welding," and "Field-Erected Structures."

AIME Program

AIME's Institute of Metals Division will open its program with sessions Monday, October 19, on "Plastic Deformation," "Metallography," "Thermodynamics" and "Constitutional Diagrams." In the evening will be a panel discussion on "Recrystallization."

October 20 program will start with "Transformation," followed by an all-day symposium on "Physical Metallurgy of Titanium and Its Alloys," sessions on "Research in Progress," and "Creep."

AIME will conclude its technical program on October 21 with sessions on "Plastic Deformation of Titanium, Molybdenum and Zirconium," and "Physical Metallurgy."

SNT Program

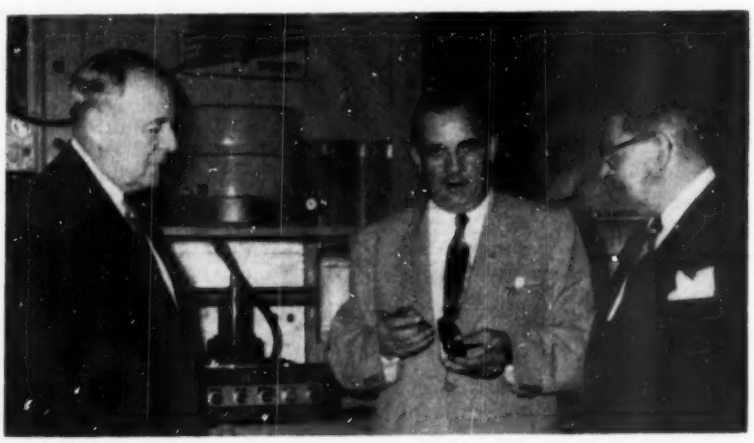
Society for Non-Destructive Testing open its program October 19 with welcoming addresses, and a concurrent session on "Education." October 20 sessions will include "Betatron Radiography," and the Lester Honor Lecture on "Field Application of Radiography," by Adair Morrison of Arthur D Little Inc.

Wednesday's SNT sessions will cover "Isotopes and Problems of Non-Destructive Testing Here and Abroad," and "Ultrasonics."

Final SNT sessions on Thursday, October 22, will cover "Magnetic Particle and Penetrant Inspection," and "Eddy Current."

Show Hours

Exposition hours will be from noon to 10:30 pm, Monday through Wednesday, October 19-21; and 10:00 am-6:00 pm, on October 22-23.



AT THE THIRD EUROPEAN MACHINE TOOL SHOW, BRUSSELS, left to right: O L Bard, president, and P F Zerkle, sales manager, were on hand with Gaston E Marbaix, managing director of Michigan Tool's British representatives to explain fine points of the company's products to prospective European buyers

SAE's Two-Day Aircraft Production Forum Discusses How to Get More Planes Per Tax Dollar

LOS ANGELES—How do you get more airpower per tax dollar? Aircraft industry engineers from all over the country met here to seek the answer to this and other $64 questions at a two-day Aircraft Production Forum preceding the Society of Automotive Engineers National Aeronautic Meeting, held here Sept 29-Oct 3.

In round table and panel discussions, aircraft designers and builders took up the question of economy in such related fields as quality control, manufacturing costs, materials handling, tooling, plant layout and procurement.

Out of it all, one thing seems certain—today's faster, higher flying aircraft, with their increased emphasis on structural strength, require closest departmental cooperation to keep production costs from skyrocketing.

Quality Control

Discussing how to keep quality up while driving costs down, the quality control engineers group concluded that more pressure should be put on management to include design of tailored-to-the-job inspection tools in production planning.

End-inspection vs in-process inspection brought out opposing views. The consensus: use of either method depends on whether the item in question is a component or a complete aircraft.

Materials handling session brought out this unusual view—perhaps delicate parts are being given too-careful treatment, thus booming the cost of handling. Said one engineer, "We have poured money down the drain by packaging too elaborately."

Discussing handling of stainless steel sheet, one engineer said his firm kept the sheets well-oiled and stored indoors before processing. Two other firms disagreed with this method, maintaining stainless sheets can be kept outdoors with little or no damage. Discussed, too, were tool storing methods, ranging from oil-based coatings to vapor inhibitors.. Newest and most popular method for protecting parts prior to delivery: washable protective coatings.

Another point brought out by the materials handling men: material handling is no longer dictated by plant layout. With the current trend toward heavier structural sections, the reverse is true.

Session on control of manufacturing costs agreed on one point—too many changes are required once an aircraft is in production. Blame for this, it was felt, lies equally between government and industry—industry for incorrect design, government for altering its plans after production starts.

Tooling

These questions came up for strong discussion in tooling sessions: how closely should tooling work with preliminary design engineers? Where should the line of responsibility be drawn?

Some firms felt close cooperation was the answer. Others took the stand that cooperation should consist solely of design engineers showing tooling people which of two possible paths is least expensive. Most panel members agreed that final responsibility for an operation rests with the design engineer.

Procurement discussions touched on the need for greater liaison between prime and subcontractors. The Air Force, according to Brig Gen K D Metzger, chief of the Air Materiel Command's Production and Resources Division, believes short-term subcontracts may be costing USAF money. More economy can be achieved, he indicated, if the prime contractor would place subcontracts for the same length of time as his prime contract, thus taking advantage of lower per-unit costs.

When the Aircraft Production Forum closed, SAE engineers turned their attention to technical sessions on basic design, production and operation of 70,000-ft ceiling, supersonic-speed aircraft. With correct planning and cooperation, the US taxpayer could get more of these for his dollar.

Air Force Halts Cutbacks, Announces Increases in B-52's, F-100's, C-123B's

WASHINGTON—The Air Force will plow the $1 billion saved by recent airframe and engine contract cancellations into new orders for later-model planes and powerplants. That's implied in Air Force Secretary Talbott's decision to begin large-scale production of B-52 Stratofort jet bombers.

- Some new developments in the upward trend of new orders:
- Boeing's Wichita, Kan, plant, now producing B-47's, will become a second source for the B-52.
- North American F-100 super Sabrejet production will be increased by about $250 million.
- Chase C-123B assault transports, scheduled for production by Chase and Kaiser, then cancelled, will go into production at (it's a good bet) Convair Fort Worth.

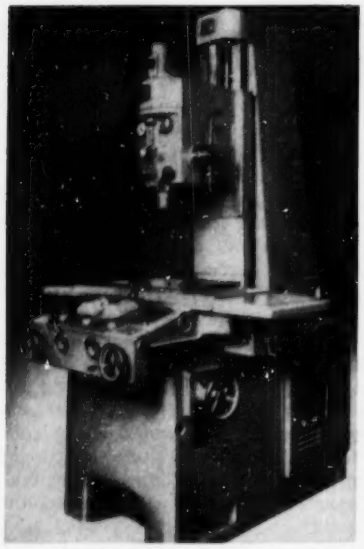
Large-scale output of B-52's means full production at Boeing Seattle, primary source, plus $250 million more tooling at Boeing Wichita. Air Force has not yet placed orders at Wichita, but funds are available in the 1954 budget. Original production order has already been increased at Seattle, with initial B-52 deliveries set for early 1954 at a 4-a-month rate.

Major reason for a secondary B-52 source at Wichita is Seattle's strategic vulnerability.

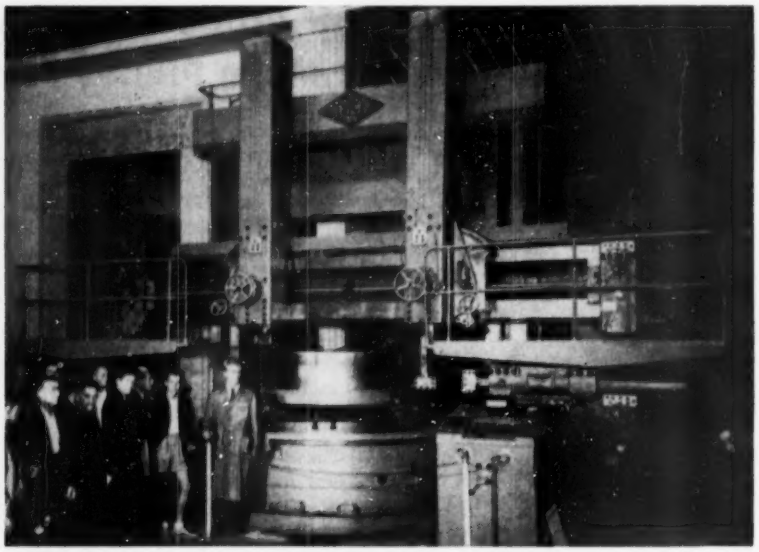
Production of the B-47 at Wichita will continue at Wichita until B-52 output is phased in. It will take about 18 months to tool up for B-52's. If B-52 priority cuts B-47 output at Wichita, additional capacity will be available at Lockheed's Marietta, Ga, plant, and at Douglas's Tulsa plant. But the Air Force doesn't expect that to happen.

Tulsa is scheduled for a large B-47 cyclic maintenance program: Marietta for production of Lockheed C-130 turboprop transports.

It is understood that the Air Force has finished its selective screening of the aircraft and engine procurement program and, for the present at least, has knocked out all the planes it plans to.



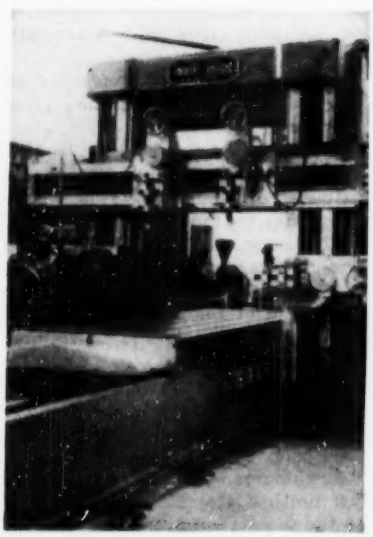
OPTICAL JIG BORER with Zeiss Jena optics achieves 0.002 mm accuracy, 125-560, 630-2800 rpm spindle speeds



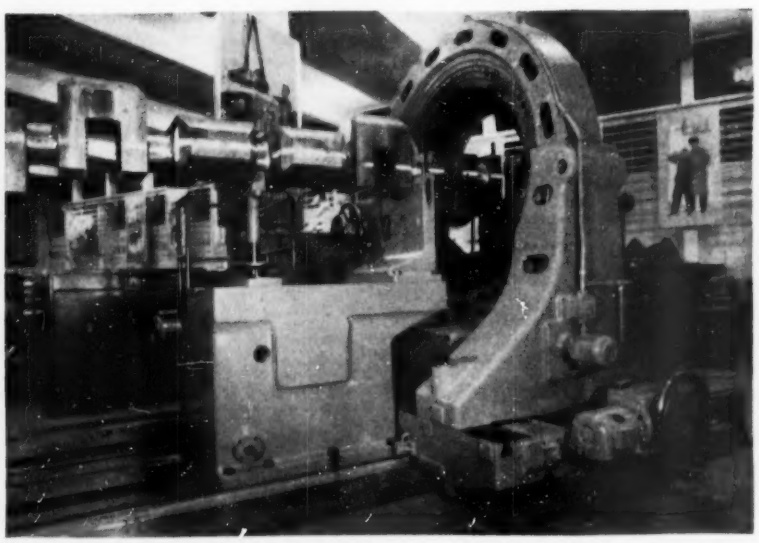
USSR DOUBLE-COLUMN VERTICAL BORING MACHINE has maximum diameter of 3400 mm, or 3200 mm with side support. Maximum workpiece height is 2000 mm, and 3100 mm diameter face plate handles up to 20 tons at 0.6 to 31 rpm

Soviet Bloc Countries Unveil

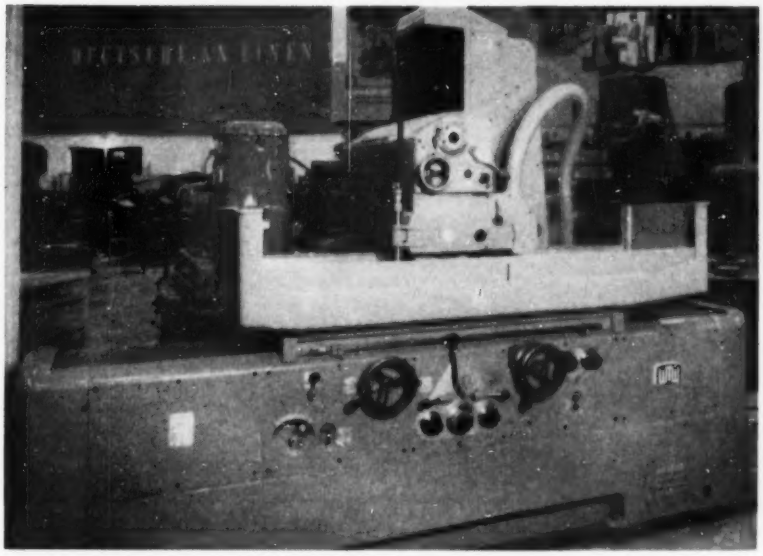
Here are exclusive photographs of machine tools exhibited by Iron Curtain countries at the recent Leipzig Fair (detailed report on the Fair appeared in the September 28 issue). Newest models of machine tools held the spotlight in the exhibits of every country participating in the Fair—Russia, Eastern Germany, Communist China, Czechoslovakia, Poland, Hungary and Bulgaria.



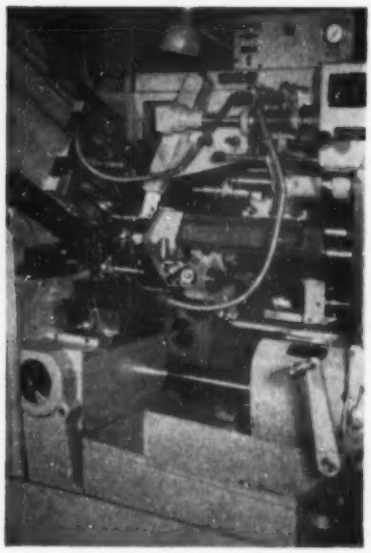
CHINESE DOUBLE-COLUMN PLANER has 1300 x 4000 mm table, speeds of 6-60 mpm with fast return



E GERMAN CRANKPIN LATHE has maximum central opening of 1250 mm. Minimum permissible crankpin diameter is 110 mm, length 85 mm. Machine has 12 turning speeds from 2.65 to 25 rpm, 7 cross and longitudinal feeds from 0.1 to 6.4



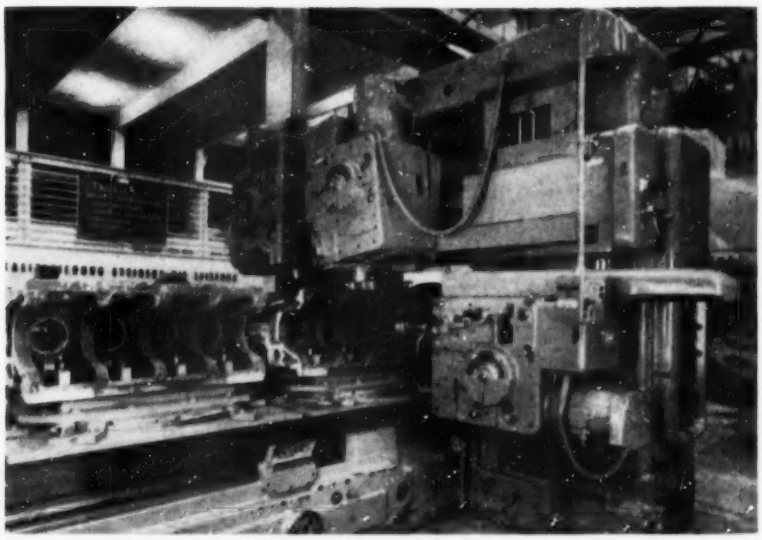
E GERMAN HYDRAULIC SURFACE GRINDER has 250 mm x 1600 mm table. Maximum height of the 300-mm diameter wheel above the table is 400 mm. Note excellent finish characteristic of all German machines displayed at the Leipzig Fair



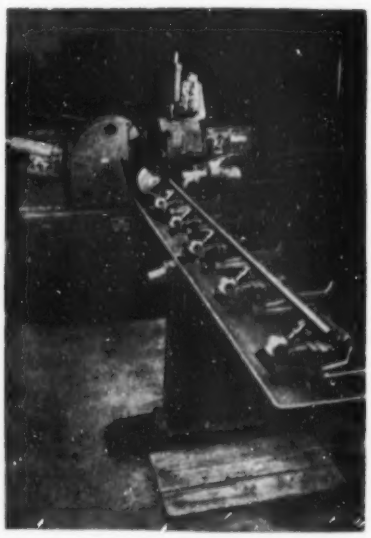
USSR 6-SPINDLE BAR AUTOMATIC with four cross slides and 66 spindle speeds from 88 to 1620 rpm

Machine Tools at Leipzig Fair

Noteworthy advances in Soviet machine-tool building observed at the Leipzig Fair for the first time this year included such Western innovations as optical jig borers, horizontal and vertical internal broaching, thread-whirling and fly-cutter lead screw lathes, centerless grinders, increased numbers of copying lathes and gear grinders, and an overall emphasis on heavier machine tools.



E GERMAN 4-HEAD PLANO MILLER has 1250 x 1600 mm table and 1600 mm between columns. Height of tilting vertical spindles over table is 275 to 1250 mm, and 18 spindle speeds from 18 to 900 rpm are available



GERMAN CENTERLESS GRINDER with work support that handles 40 mm dia rods up to 6 meters long

WEST BERLINERS FORM TOOLING POOL

WEST BERLIN, GERMANY—Sparked by an American industrialist, some three-score West Berlin metalworking firms are combining their facilities and craftsmen into a "tooling pool" to undertake work for US and other Western firms in every field of metalworking.

Creator and driving force behind the plan is American Louis Scheel, managing director of Flohr-Otis, G.m.b.H, German subsidiary of Otis Elevator Co, who explains the project this way:

"We have undertaken the initiative to help the unemployed situation in Berlin by entering into a working agreement with a number of toolmaking companies in that city to insure a maximum capacity for quick delivery and the availability of specialists in the various fields of toolmaking. This will enable Berlin metalworking companies to accept orders for tooling which are not in their own production programs nor beyond their own current production capacities.

Quick Delivery, Low Prices

"The advantage to a customer is a quality product with quick delivery and at a competitive price, even considering transportation and customs charges. Highly qualified tool designers are available for preparation of drawings in metric or American measurement in any language."

Here's how the tooling pool works: when an order is received by the pool, selection is made from member companies on a basis of availability of facilities and familiarity with the type of tooling involved. The latter is possible because of the wide variety of metalworking phases covered by member companies.

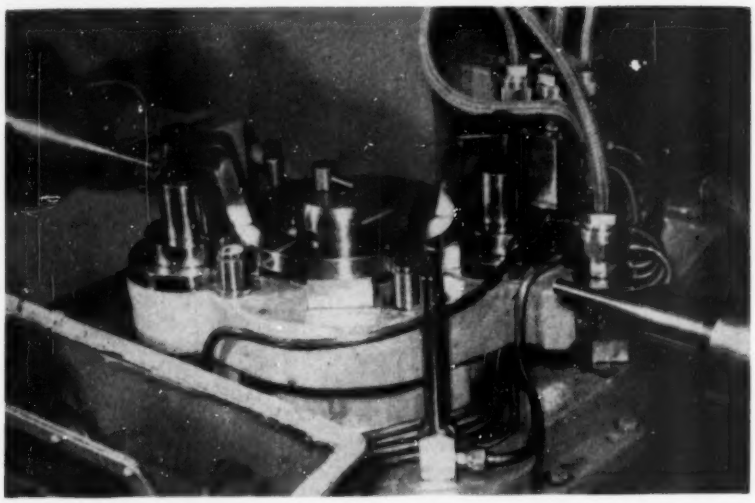
US Orders Welcomed

The object of the plan is not to compete with US and other Western tooling firms, but rather to act as a corollary source for manufacturers whose production is delayed by backlogged tooling.

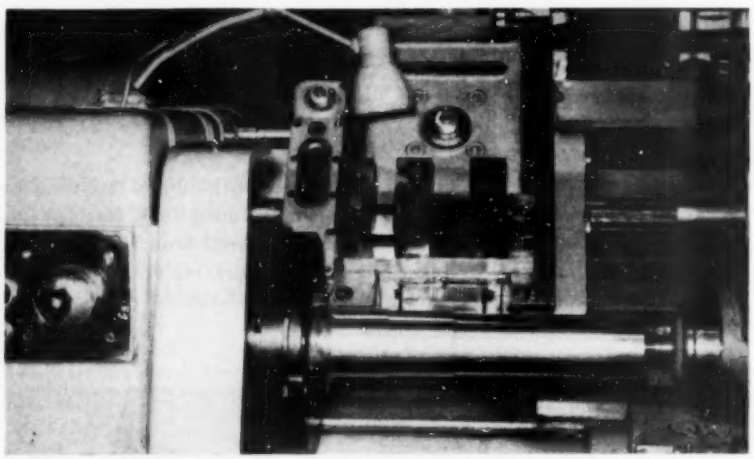
The pool has already delivered substantial tooling orders for European subsidiaries of US firms and has many inquiries from American companies.

To expedite orders and inquiries from the United States, an office has been set up at the German-American Trade Promotion Office, Suite 6900, Empire State Bldg, 350 5th Ave, New York 1.

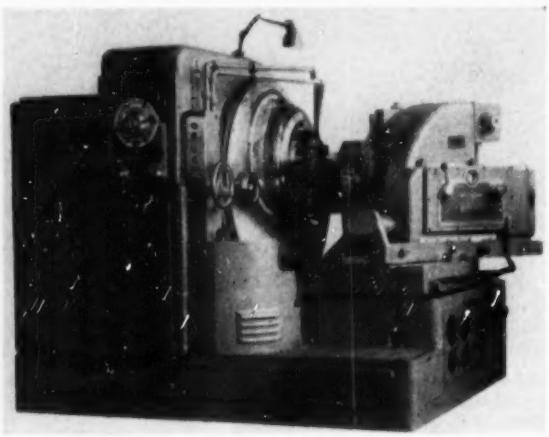
Soviet Machine Tools...



RUSSIAN DOUBLE HORIZONTAL FINE BORING MACHINE uses diamond-tipped tools operating at 5000 revolutions per minute. Maximum boring diameter is 200 mm, minimum 10 mm. Table is 400 x 600 mm

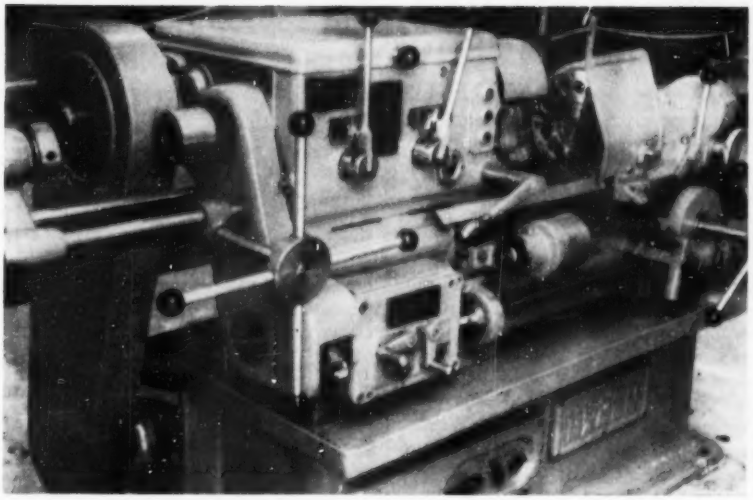


RUSSIAN SEMI-AUTOMATIC MULTIPLE-TOOL LATHE with two hydraulic support feeds: upper 4 to 940 mm per min, lower 13 to 900 mm per min. Maximum swing over bed is 320 mm, center distance 800 mm, spindle speeds 56-100 rpm

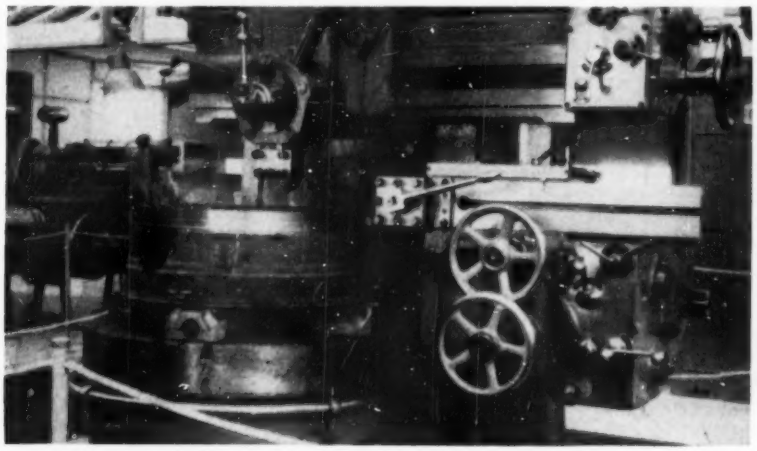


RUSSIAN spiral bevel gear generator shown at the Leipzig Fair. Details were not available on this unit, which is similar to one shown on opposite page

Soviet Machine Tools...

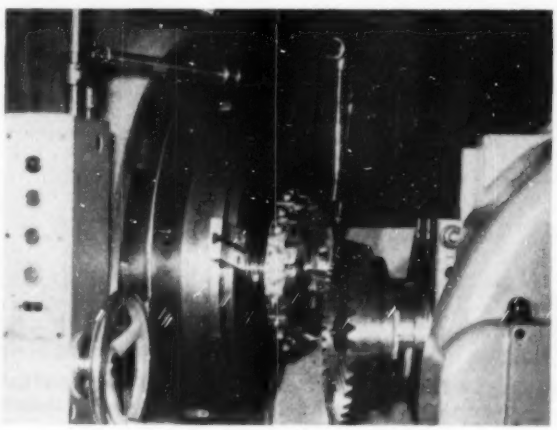


CHINESE DRUM TURRET LATHE has 185-mm diameter turret, mechanical feed. Maximum chucking diameter for round bars is 36 mm, hex 32 mm, square 27 mm. Two spindle speed ranges: 48-480 rpm and 117-1160 rpm



CHINESE SINGLE-COLUMN VERTICAL TURRET LATHE. Maximum diameter of the workpiece without side support is 1250 mm. Machine is available with 12 table speeds ranging from 7.5 to 150 rpm

RUSSIAN spiral bevel gear generator. Maximum diameter of gear blank is 800 mm, minimum diameter 25-35 mm. Maximum modulus is 15. Spindle speed ranges from 21-300 rpm. Tooth gear illustrated here was supposedly finished in 40 min, the rough cut taking 1 min per tooth, and finish cut 15 seconds



Donald C McGraw Heads McGraw-Hill

NEW YORK — Donald C McGraw was elected president of the McGraw-Hill Publishing Co, Inc, publishers of *American Machinist*, at a meeting of the Board of Directors here September 18. He succeeds his brother, the late Curtis W McGraw.

Youngest Son of Founder

Mr McGraw, youngest son of the late James H McGraw, Sr, founder, has been associated with the company since 1919. He has been a director since 1935, vice president since 1945. During World War II, he was a consultant to the War Production Board's Printing and Publishing Division.

Born in Madison, NJ, Mr McGraw attended Lawrenceville School and Princeton University, and served in the Navy in World War I.

He joined McGraw-Hill in 1919 as a member of the advertising staff of *Chemical and Metallurgical Engineering*, now *Chemical Engineering*. Two years later, he transferred to the pressroom and composing room, and in 1924 headed that operation for the entire company.

Headed Printing Operations

Since 1933, when he was made secretary of the company and put in charge of production and manufacturing, Mr McGraw has been responsible for handling all contracts for printing and binding, engraving and paper supply for all McGraw-Hill operations.

In 1945 he was named vice president for manufacturing and general services, the position he held at the time of his election to the presidency. In 1950 he became a director of the McGraw-Hill Book Co and Newton Falls Paper Co, in which McGraw-Hill owns a half interest.

Other officers of McGraw-Hill Publishing Co remain unchanged.

Harrington Wilson Brown Opens Tool Showrooms in Mount Vernon, NY

MOUNT VERNON, NY — A week-long program of luncheons, receptions and dinners, climaxed by a day of golf at the Westchester Country Club, marked the opening of Harrington Wilson Brown Co's new offices and machine-tool showrooms here.

Features of the company's new facilities include a large demonstration room where machines are on display under power at all times, and a special engineering and conference room equipped with motion picture and slide projectors to assist the customer in specifying the right tool for his job.

Harrington Wilson Brown has moved into its larger Mount Vernon headquarters after nearly 30 years in Manhattan to help the company, as President Dan Harrington puts it, "perform as a fast-moving, expertly equipped medium between our manufacturers and our customers." The new location, adjacent to rail and highway transportation, facilitates service and deliveries, and eliminates metropolitan customer inconveniences such as parking, etc.

More than a score of nationally-known machine tool firms, serving all phases of metalworking, are represented by Harrington Wilson Brown. In addition, the company now offers complete engineering services —layout and work-load planning, time estimates, etc.

Marshall & Huschart, Chicago Tool Distributors, Celebrate 60th Year

CHICAGO—Threescore years ago in the midst of a business panic that saw 600 banks fail, Alfred Marshall arrived in Chicago to establish a Midwest sales agency for Prentiss Tool & Supply Co of New York. Today, celebrating the 60th anniversary of its founding is the offshoot of that modest beginning, Marshall & Huschart Machinery Co, a machine-tool sales and service organization representing 20 of the world's foremost machine-tool manufacturers.

In the 60 years since its beginning, when some of the area it covered was listed on maps as "Indian Territory," Marshall & Huschart has reduced its area coverage to five states: Illinois, Indiana, Iowa, Michigan and Wisconsin—the company feels it can give better service by concentrating its efforts on these states.

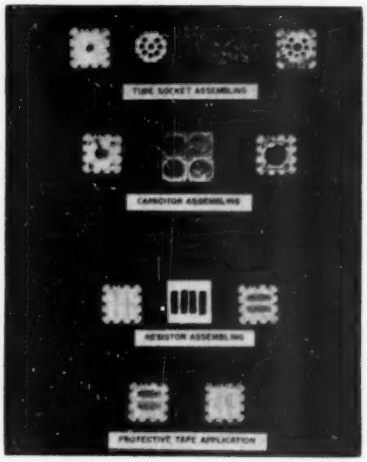
Marshall & Huschart attributes much of its success in both the sales and engineering fields to its employee relations. Since its inception, ownership and management of the company has always been passed on to its employees, practically all of whom are stockholders. Thus, Marshall & Huschart is today operating under its third generation of management. Board chairman George Habicht, Jr, is past president of the American Machine Tool Distributors Association. President F L Armstrong and F H Habicht, vice president and general manager, are both longtime employees of the company.

Perhaps the most sincere compliment that can be paid this long-established firm is attested by the fact that it has represented two firms since its beginning in 1893—Cincinnati Bickford Tool Co, and Gould & Eberhardt. Many other world-prominent machine-tool firms have been with M & H for more than 50 years.

George Habicht, Jr
Chairman of Board

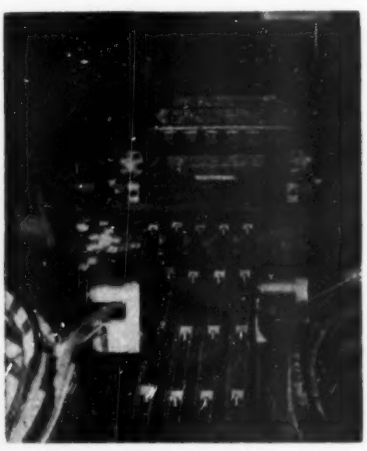
Frank L Armstrong
President

Frank H Habicht
V P and Gen Mgr

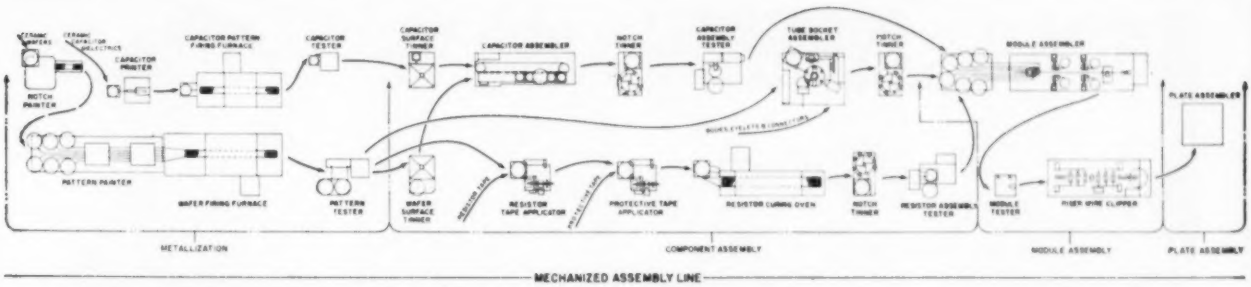


"Project

WASHINGTON — "Project Tinkertoy," developed by the National Bureau of Standards under assignment for the Naval Bureau of Aeronautics, provides fully automatic manufacture and assembly of unit circuit elements. Fully automatic process cycle produces printed circuits on ceramic wafers, adds tape resistors and interconnecting plates for modular circuitry, delivers a completely functional, weight and space saving electronic assembly. No manual operations are involved. Entire operational cycle is coordinated and controlled by an electronic brain guided by punch-cards. Process is now available for commercial use. Drawings and specifications are available from the Navy Bureau of Aeronautics, Washington, DC.

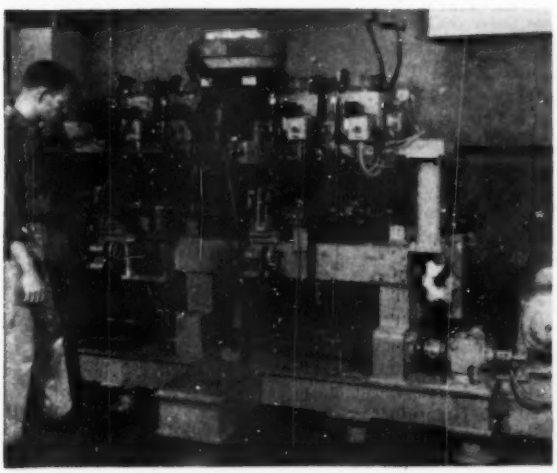


MODULE ASSEMBLER combines resistors, capacitors and socket tubes

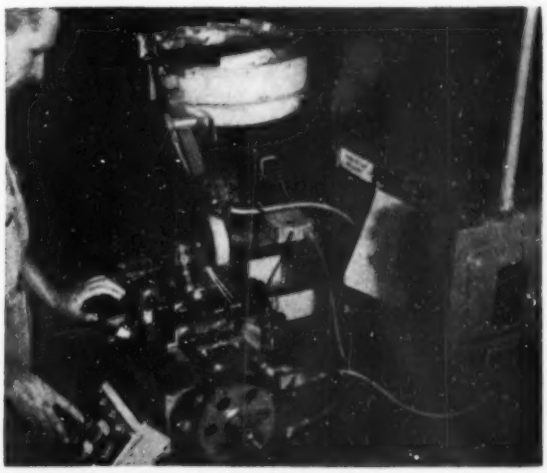


"PROJECT TINKERTOY" FLOW CHART shows how ceramic wafers are made into resistors by being notched, pattern painted, fired, pattern tested, and surface tinned. Then resistor tape and protective tapes are applied and wafer is oven-cured. Notches are then tinned and sub-assembly is resistance tested. Simultaneously, wafers are made into capacitors by a similar process in a parallel production line. At the same time, a third production line fabricates the tube socket. Then all sub-assemblies are channeled into the module assembler, tested for continuity and wire ends are trimmed off. The "sandwich" is then ready for final assembly into electronic components

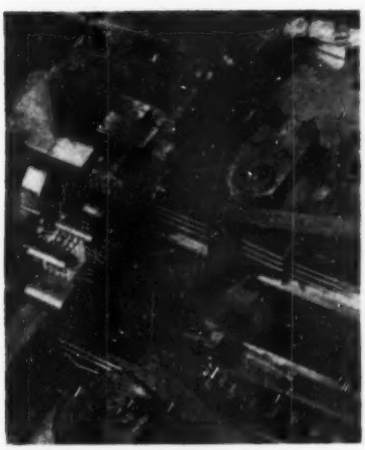
Tinkertoy"—Boon to Electronics Industry



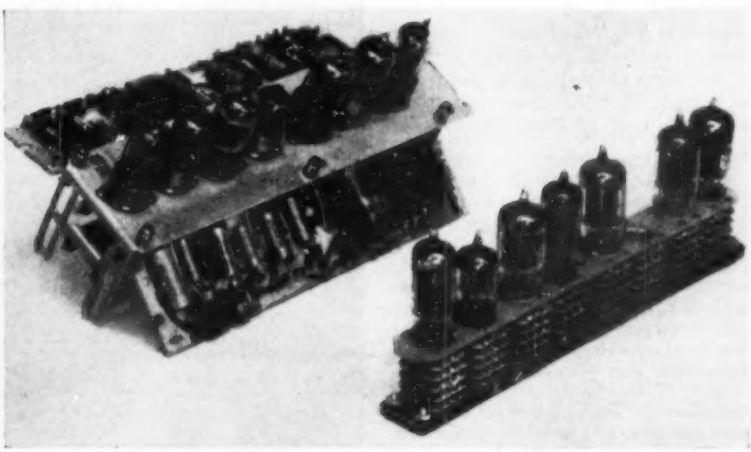
INDUCTION HEATING UNIT clamps and bonds capacitor parts together. In this automatic operation, all contacting tinned surfaces are mechanically, electrically bonded.



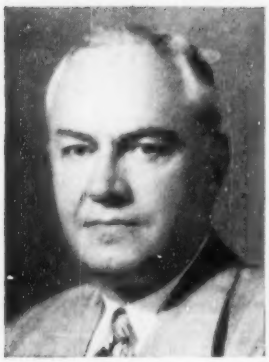
RESISTOR TAPE APPLICATOR notes required resistor values and placement as specified by modular worksheet. Unit indexes, tapes and ejects four resistors at once



MODULE ASSEMBLER SECTION stacks, wires and solders wafers



"PROJECT TINKERTOY" provides compactness, lightness, simplicity for electronic assemblies. Compare its product (right) with conventional assembly (left)



Raymond S Perry

James F Magin

Dr Louis T Rader

Roger O Bay

Names in the News

Raymond S Perry has been elected president of Federal Telephone & Radio Co, Clifton, NJ, a division of International Telephone & Telegraph Corp. He succeeds **Henry C Roemer,** president since 1951, who is returning to IT&T headquarters as vice president in charge of administration of the domestic division. Mr Perry joined the company in 1949 as general sales manager; since 1951 he has, in addition, been vice president and director in charge of domestic and government sales activities.

James F Magin has been elected vice president of the Square D Co, Detroit. Mr Magin, who was elected a director of the company last year, makes his headquarters at the Milwaukee plant where he has been assigned as staff assistant to the general manager in the special controls section.

Raymond L McFarland, formerly chief of the industrial service section of the Army Ordnance regional office in Toledo, Ohio, has been appointed plant manager of Firth Machine & Tool Co.

→

L H Geddes has been named executive vice president of Greenlee Bros & Co, and of its subsidiary, Greenlee Tool Co, Rockford, Ill. Mr Geddes was formerly vice president of the parent company. **D E Hawkinson** has been elected vice president of Greenlee Bros in charge of machine tool sales, and **R J Samuelson** vice president of the subsidiary, in charge of tool sales. **R O Knudson** has been appointed assistant sales manager of special metalworking machinery, and **C P Block,** assistant sales manager of automatic screw machines.

Dr Louis T Rader has been named general manager of the newly-established Specialty Control Dept at General Electric Co's Schenectady works. Appointments to Dr Rader's staff include: **K N Bush,** manager of manufacturing; **H L Palmer,** engineering; **J P Rutherfoord,** marketing; **C S Van Wormer,** finance.

Theodore W Rundell has been named vice president in charge of operations at Servel, Inc, Evansville, Ind. He has been vice president in charge of engineering since 1952.

Roger O Bay has been elected a vice president of Bonney Forge & Tool Works, Allentown, Pa, subsidiary of Miller Mfg Co of Detroit. Mr Bay will continue to serve as sales manager of Bonney's Tool Div, a position to which he was appointed last May. Prior to that he was sales manager of Cleveland Pneumatic Tool Co's Automotive Div.

Kenneth Van Kampen has been named general superintendent of the Warner Electric Brake & Clutch Co, Beloit, Wis. Mr Van Kampen, formerly magneto division supervisor in the Beloit plant of Fairbanks-Morse, joined the Warner firm last June.

D E Hawkinson, R J Samuelson, L H Geddes

P B Gibbons

A A Fomilyant

Carl F Jensen

B P Gibbons has been appointed to the newly-created position of manager of material, and **Paul G Osborn** factory manager of Plant I at Convair's San Diego division. Mr Gibbons, who joined the company in 1951 as executive assistant to the vice president of manufacturing, was chief of production control for the plant prior to his promotion. Mr Osborn moves up from his post as superintendent.

Paul W Brannon has been named vice president, manufacturing, of Pesco Products Div, Borg-Warner Corp, at Bedford, Ohio. He has been associated with the division for the past year, most recently in the capacity of manager of manufacturing.

John J Kinsella has been elected president of Precision Scientific Co, Chicago; he succeeds **Chester A Warner,** named chairman of the board. Mr Warner fills the vacancy created by the recent death of **Walter W Pitann,** founder of the company. **Arthur Pitann** has been named vice president and secretary, succeeding Mr Kinsella. **George E Bader** has been appointed vice president, manufacturing, and **Edmund E Tice,** vice president, finances.

Paul B Brown has joined the Peninsular Grinding Wheel Co in the capacity of vice president and general manager.

E R Rowley has been named president of Titanium Metals Corp of America, a subsidiary of National Lead Co and Allegheny Ludlum Steel Corp. Mr Rowley, also named a director and member of Titanium's executive committee, has been production manager of National Lead since 1948. **Philip C Muccilli,** formerly assistant production manager, succeeds Mr Rowley.

A A Fomilyant, Los Angeles district manager of Rockwell Mfg Co's Meter & Valve Div, has been named general manager of the company's Macnick Div at Tulsa, Okla. He succeeds **W M Connor,** who will supervise sales and production liaison between the division's national headquarters at Pittsburgh and divisional plants and field offices. **E M Cloran,** western regional supervisor of gas products sales, will take over Mr Fomilyant's former post.

Carl F Jensen has been appointed manager of the Des Plaines Stamping Plant of Illinois Tool Works' Shakeproof Div. In addition to his new assignment, Mr Jensen will continue to be responsible for Shakeproof's special products engineering and sample parts operations located in Elgin, Ill.

Ernest Nuber has been appointed sales manager, instrument division, the Bristol Co, Waterbury, Conn. Mr Nuber joined the firm in 1929; he was made Pacific Coast manager in 1934, and in 1948 was named manager of the application engineering department.

W P Carothers has been appointed vice president and general manager of Kolcast Industries, Cleveland. Mr Carothers was formerly vice president in charge of production for United Tube Corp.

Friedrich Gsell, president of Reishauer Tool Works, Zurich, Switzerland, and **Albert Rickenman,** the company's chief engineer, have arrived in the US for an 18-city tour of major industrial areas. Their host is **Julius Mueller,** president of Cosa Corp, machine tool importers and sales representatives in this country for Reishauer-made precision gear grinders, thread grinders, and similar equipment.

Donald R Guthrie has been named assistant general manufacturing manager of the coated abrasives and related products division of Minnesota Mining & Mfg Co. Prior to his appointment, Mr Guthrie served as executive engineer in charge of engineering research.

H C Mathey and **Bicknell Lockhart** have been elected vice presidents of the Liquid Carbonic Corp, Chicago. Mr Mathey, who joined the company in 1926, will, in his new post, be general manager of the Pacific Div, as well as president of the Stuart Oxygen Div. Mr Lockhart will be in charge of all durable goods manufacturing activities in Chicago.

S S Meadows has been named vice president and manager of the new transmission department of Borg-Warner's Marvel-Schebler Products Div, Decatur, Ill. **Glen Bamberger** has been appointed works manager of the carburetor and aircraft departments; **Edward Walsh** has been named chief industrial engineer of these departments. Mr Meadows was formerly works manager of the Detroit Transmission Div, General Motors; Mr Walsh was assistant to the vice president of manufacturing at Globe Union, Milwaukee; Mr Bamberger was associated with the Globe Stamp Div, Hupp Corp, Cleveland.

OBITUARIES

Herbert A Gottschalk, 56, sales management executive of Kearney & Trecker Corp, Milwaukee, died Sept 26 after a short illness. Mr Gottschalk was assistant to the vice president in charge of sales, in which capacity he directed that offices's administration, as well as export sales. He had been a member of the company's management group since 1947.

EXHIBITORS

35th National Metal Congress and Exposition
Cleveland, Ohio, Oct 19-23, 1953

EXHIBITOR	BOOTH NO.
A	
AMERICAN MACHINIST (publ)	1706
Ace Drill Bushing Co, Inc	2619
Acetogen Gas Co	1108
Acme Mfg Co	1651
Acme Steel Co	2323
Acme Tool Co	726
Adamas Carbide Corp	2550
Ajax Electric Co, Inc	221
Ajax Electrothermic Corp	221
Ajax Engineering Corp	221
Ajusto Equipment Co	2471
Aldridge Industrial Oils, Inc	702
Allegheny Ludlum Steel Corp	131
Allied Chemical & Dye Corp	2567
Allis-Chalmers Mfg Co	2621
Allison Co, The	2561
Alloy Engineering & Casting Co	2661
Alloy Metal Wire Co, Inc	2723
Alpha Corp, The	2602
Alpha Metals, Inc	643
Alvey-Ferguson Co	2509
American Brake Shoe Co	305
American Brass Co	141
American Cast Iron Pipe Co	2233
American Chain & Cable Co, Inc	1716
American Chemical Paint Co	1104
American Cyanamid Co	2311
American Cystoscope Makers, Inc	1730
American Gas Association	2645
American Gas Furnace Co	2749
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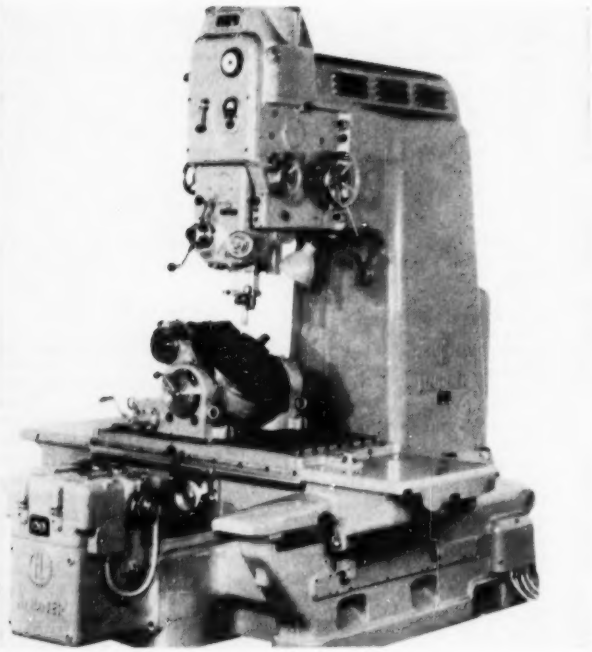
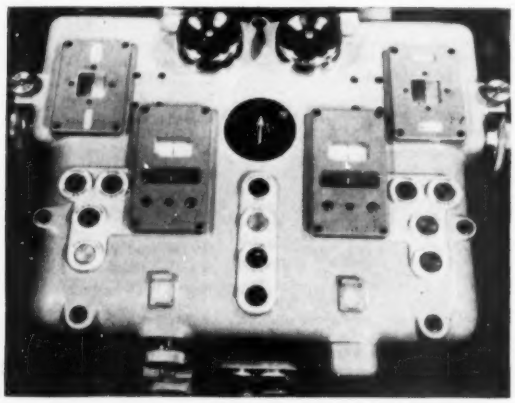
SHOW IN PRINT

Products shown in this section have not been described previously in our pages. They will be exhibited at the National Metal Congress and Exposition Public Auditorium, Cleveland, October, 19-23





Optical and photoelectrical centering devices for longitudinal (right center) and transverse (left center) table positioning speed accurate hole location. Optical device (AM—Feb 4, '52 p154) consists of illuminated projection screen, with integral reticle, showing image of desired location line as obtained from cylindrical measuring scale. These cylinders have a mirror-surface finish for reading the fine adjustment of table movements and are graduated by a fine helical line. As image of line approaches screen reticle, photoelectric system is energized and pointer swings in direction of optical image. Autopositioner includes pushbuttons for manual control

Preselects Jig Borer Table Positions

Lindner Autopositioner enables operator to preselect the table position for the next hole while one boring operation is in progress. An optical projection system of making settings, together with a photoelectric zero point indicator, permits exact centering with minimum of visual fatigue and human error. Instrument is designed for use with model LB 15 jig borer.

By means of a switch on the Autopositioner, either of two methods can be chosen for the preselection of table settings. The position of each hole can be expressed in terms of its distance from a fixed reference point or each hole can be located by its co-ordinate distances from the preceding hole.

As a representative instance of preselection, assume the work accurately positioned under the spindle for boring a hole centered at any point A. A is made the reference point for the next hole, B, by setting the drums to zero by means of their graduated dials and verniers. Next, A is established as the zero point on the longitudinal and transverse projection screens by means of the two knobs in the foreground of the Autopositioner illustration. As shown for the right-hand control, protective covers are then placed over the knobs.

Graduated drums are then set by means of their verniers to the decimal figures of the required movements. Movements are controlled by knobs at the extreme upper left and right of the photograph. Settings are read on the adjacent preselector dials in inches and "tenths." Lighted arrows indicate the direction of table movement. This completes preselection process.

When boring operation at A is complete, operator presses start button and table moves, within close limits, to position selected for point B. For exact centering, operator views projection screens and photoelectric indicators. Minor adjustments can be made by two handwheels visible at top center of photograph.

With use of the Autopositioner, table settings are guaranteed by manufacturer to be within 0.00015 in., readings within 0.00005 in.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Elox High-Frequency Electrical Discharge Machine For Die-Making

New model M-400 Elox machine is an improvement on the earlier M-300 model (AM—Dec 22, '52, p170) and features an entirely new power supply and automatic feed arrangement. Use of high-frequency current now makes it possible for the operator to exercise minute control over the discharge. Thus the power supply has now been designed for the precision work necessary for die-making operations.

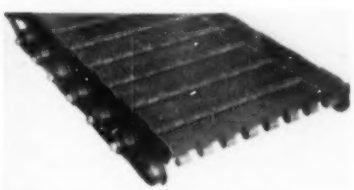
The high-frequency power unit requires 220-v, 3-phase current and reportedly is the result of ten years of research.

With the development of this precision equipment, manufacturing of the electrodes has become at least as important as the sinking of the cavity itself. The maker reports that one job performed recently required two hours for the operation and 16 hours for making the electrode.

Control of the length and volume of discharge reportedly makes it possible to attain surface finishes of from 50 to 80 micro inches, depending on the material used and amount of current supplied to machine. Under special conditions, attachments are available to give a finish as fine as 10 mu-in.

Once the electrode has been set up, automatic feed device makes the operation of the machine completely automatic.

Elox Corporation of America, 740 N Rochester Rd, Clawson, Mich



Steel Belt Link Redesigned

Standard component links of May-Fran hinged steel belt have been redesigned to incorporate four interlocking flanges on each side of the link.

Arrangement provides a greater distribution of stress on the belt and also allows links to be staggered, eliminating lateral movement between individual links and minimizing fall-through of scrap. Increased precision in the positioning of links is said to provide a slightly increased carrying capacity. Links are available solid or with perforations which permit drainage of coolants and other solutions.

May-Fran Engineering, Clarkstone Rd, Cleveland 12, Ohio

Four Models of Mead Column Press

Single-acting or double-acting, 3- or 4-in. bore models of the Mead column press are now available. One adjustable stand takes air cylinders with either 3- or 4-in. bore, either single- or double-acting.

Double-acting cylinders can be furnished with any length of stroke from 0 to 36 in. Presses illustrated have 4-in. stroke. Single-acting cylinders have maximum stroke of 4 in., return stroke by internal spring.

Upper ram of double-acting presses is provided with depth-stop nuts and collars to regulate stroke exactly within limits of cylinder ordered. Single-acting presses have no upper ram or depth stop adjustment. Mounting bracket permits both vertical and radial adjustment.

Column is solid steel; table is machine-surfaced but not hardened. All rams can be made non-rotating with addition of bracket.

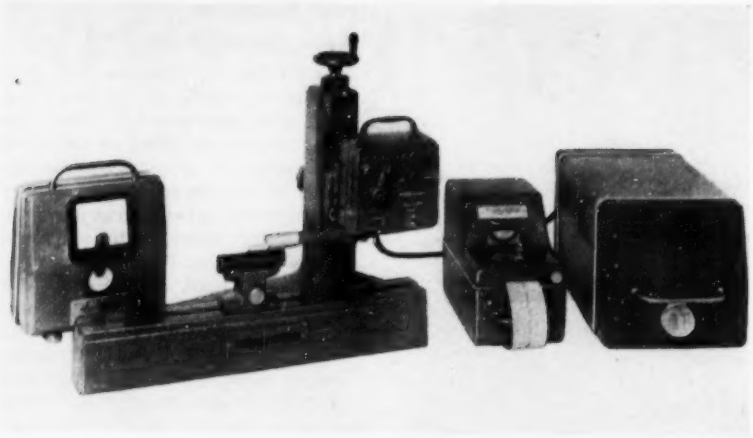
Mead Specialties Co, Dept CP-4, 4114 North Knox Ave, Chicago 41, Ill

Carbide Tool Grinder For Wet or Dry Operation

Hammond model WD-6 wet or dry carbide tool grinder uses 6-in. dia cup wheels. Power is supplied by ½-hp drive motor. Safety cup wheel disk on ends of machine prevents operator from dropping tool into cup of wheel. Patented guards and pans keep coolant off operator and floor.

In-and-out table adjustment is accomplished by screw feed and not manually slid. Pump and tank unit are contained in base of machine. Combination protractor and wheel dresser are included as basic equipment.

Hammond Machinery Builders, 1600 Douglas Ave, Kalamazoo, Mich



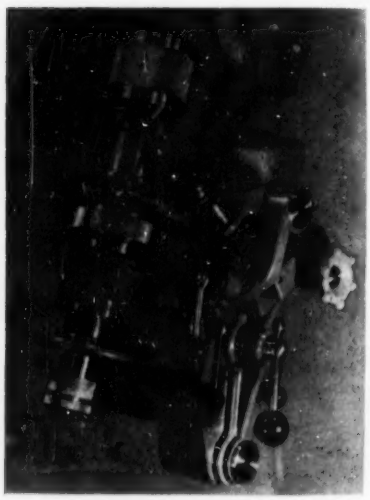
Surface Measuring Instrument Operates With Electronic Amplifier

Talysurf surface measuring instrument determines accurately the roughness of surfaces by traversing a stylus of 0.0001-in. radius under a weight of 0.1 g over area to be protected. Unit was designed for use on such precision parts as ball bearing races.

Through an electronic amplifier, either a graph indicating the nature of a cross-section of the surface is furnished, or a numerical value to the new arithmetical average standard indicating degree of roughness.

Solid unit provides facilities for mounting of work and adjustment of main instrument. Identical calibration assures permanent repeat performance. Positive indication of average roughness is evident on one traverse of the pick-up point; correct graph presentation permits gage blocks to be used for calibration; chart has straight, rather than curved coordinates for improved reading; magnification from 1000 to 50,000x. Three lengths of travel provide for average measurement: 0.01, 0.03, 0.1 in., to give correct average readings for surface irregularities of different spacing.

Engis Equipment Co, 431 S Dearborn St, Chicago 5, Ill



Web-Thinning Attachment For Twist Drill Grinder

Web-thinning and drill grinding can now be performed on the Cawi-Spiral twist drill grinder when equipped with a new attachment. Web-thinning operations are carried out on a second grinding wheel already incorporated for manual web-thinning. Major feature of attachment is pushbutton indexing device which turns chuck and drill after thinning one side of the web. Thus, grinding wheel enters reverse side of drill in exactly same position.

Provision is made for tilting entire attachment to conform with lead of drills; for adjusting depth of thinning of web; for angular setting of drill in reference to grinding wheel; and for raising or lowering the chuck to conform to length of drill.

The grinder uses a planetary gear system for grinding 2-, and 3-lip drills by turning drill on its own axis. Two chucks are needed to handle drills from 0.028 to 5/16 in. and 5/16 to 1 in.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Baldwin Compacting Press

Baldwin-Defiance Model C compacting press is a mechanical, four-column, crank-type unit equipped with flywheel, pneumatic clutch, and brake. Operation is by a variable speed drive unit with a 20-hp, totally enclosed motor. Press mechanism is completely enclosed and sealed to prevent entrance of abrasive materials, so that it may be used for compacting powdered metal, as well as pressing ceramic parts and grinding wheels.

Accurate compressing pressure is assured through use of hydraulic head, ram of which supplies opposing pressure for upper punch. If pressure exceeds that for which hydraulic accumulator is set, upper punch gives to the extent that pressure is limited and held within the setting.

Floating die holder and core rod, able to float independently, are held in normal top position by air cylinders. Positive stops, adjustable by handwheels, control distance of float. Depth of fill and stroke of bottom punch are adjusted by two separate handwheels, eliminating necessity of shimming bottom punch to bring it flush with top of die.

In addition to continuous run, press can be cycled to stop at any predetermined point, dwell up to 15 seconds, and start automatically; length of dwell is adjustable. Unit additionally operates on single stroke, combination of single stroke with dwell, or can be inched through its cycle.

Rated pressure is 100 tons; ejection capacity, 30 tons; adjustable ejection stroke, 0 to 6 in.; size of die opening, 6-in.-dia; strokes per minute, 4 to 24.

Baldwin-Lima-Hamilton Corp, Philadelphia 42, Pa

12⅛" COPPER CIRCLE AS SUPPLIED
FIRST CUPPING DRAW, DIAMETER 7"
SECOND CUPPING DRAW, DIAMETER 5"
LAST DRAW, WITH SPUN CONTOUR, BEADING, ROLLED EDGE
5¾" BRASS CIRCLE
FORMED PERCOLATOR BOTTOM
8⅛" BRASS CIRCLE
DRAWN AND FORMED LID
2⅛" FORMED BRASS COMPONENT FOR HEATING ELEMENT

FOR DEEP DRAWING METALS

Consult Revere

Crown automatic electric percolator, made by Robeson-Rochester Corp., Rochester 1, N.Y.

Some four years ago the Robeson-Rochester Corporation told us that it was dissatisfied with the quality of the copper and brass it was receiving. Could we look into it, even though it was not our metal? Revere was glad to do so. Technical Advisors studied production methods in detail, and made specific recommendations regarding temper, which they reported was the key to the matter. A trial order was placed with Revere for copper circles in the suggested temper. These drew satisfactorily, without requiring intermediate anneals, and resulted in the establishment of a lasting business association. . . . If your production methods include deep drawing, perhaps Revere's knowledge can be used to advantage. See the nearest Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N.Y.

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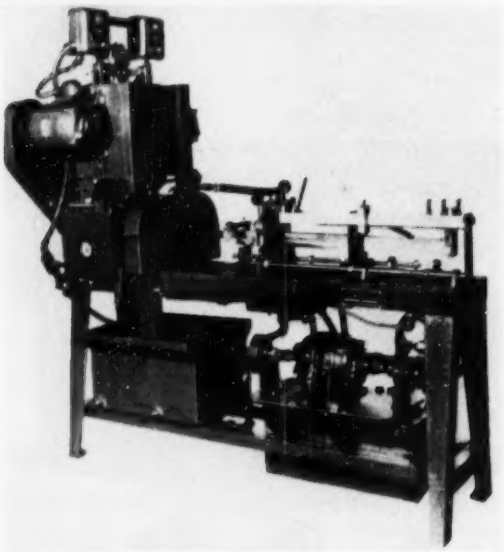
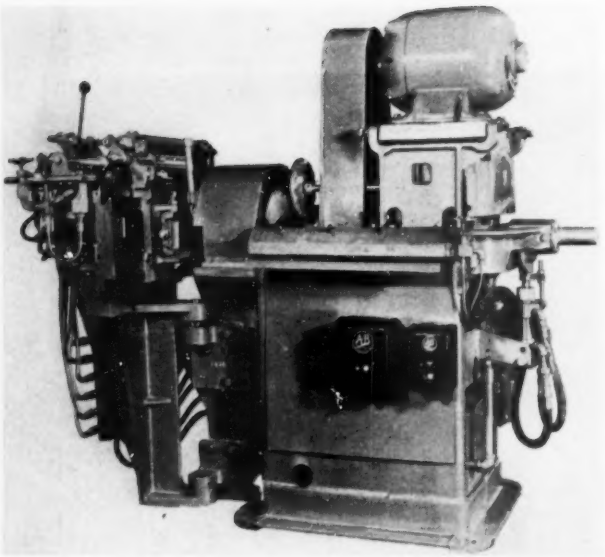
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere.

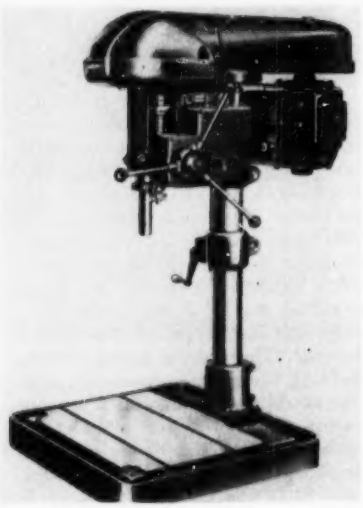
SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS



NICHOLAS HOLLOW GRINDER, a hand-chucking, hydraulically actuated unit, grinds two sides of work simultaneously, grinds identical shoulders, uses regular disk wheels, and operates on completely automatic cycle. Cam control permits following intricate patterns consistently. Machine has self-contained coolant system, infinitely adjustable speed, 11-in. working stroke. Wheel size, 9x½x3⅝-in. max, 3⅝-in. min dia. Wheel-driving motors are 2 to 5 hp per arbor — *Nicholas Equipment Co, Bellevue, Ohio*



UNIVERSAL GRINDER, Model A, for single-pass repeat grinding has fixed hydraulic sequence. Work-carriage speed and wheel-advance speed are infinitely variable with hand valves. Model B, for multiple work, has variable hydraulic sequence. Independent systems on wheel and work carriage permit advancing and retracting wheel many times during cycle. Acceleration provided on both models for fast return of carriage to chucking position. Carriage travel, 18 or 24 in.; wheel travel, 5/16 or ⅝ in.; wheel size, 16x4x13½ in. — *Nicholas Equipment Co, Bellevue, Ohio*



Power-Feed Models of 18-in. Press Line

Clausing Division of Atlas Press Co has added nine power-feed models of heavy duty 18-in. press line. V-belt from drillpress spindle drives power-feed spindle, keeping feed in direct relation to drill speed.

Power-feed unit itself is entirely gear-driven, eliminating possibility of any slip and making feed selection a matter of knob turning. Four rates of feed, plus idling position for hand feeding make Clausing power feed adaptable to any job, it is said.

Any one of three handles may be used to activate the power-feed unit; 16 teeth in positive dog-clutch assure quick action.

Atlas Press Co, Clausing Div, Kalamazoo, Mich

Scovill Is Producing Cold-Rolled Aluminum Strip

Cold-rolled aluminum strip, marketed under the name of Truspec, is now being produced at Scovill's new aluminum strip mill. The product is said to have drawing qualities similar to those of the manufacturer's continuous-cast brass strip.

All aluminum production is annealed under complete atmospheric control with a substitution of nitrogen for oxygen. Nitrogen atmosphere, injected in a bell-type furnace, minimizes oxides from forming on strip surfaces, reducing for fabricators costly cleaning and finishing operations.

Scovill Manufacturing Co, Waterbury, Conn

Horizontal Platen Grinder

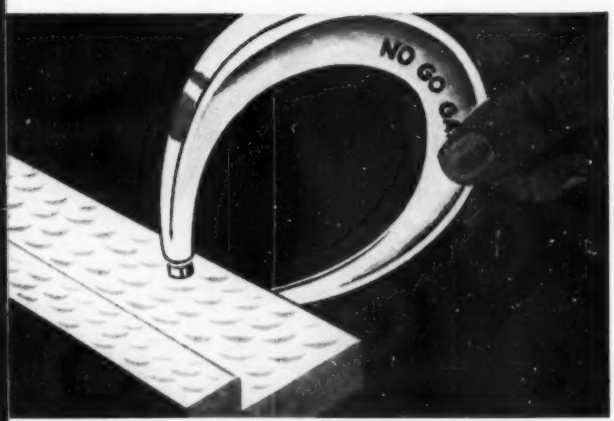
Horizontal platen grinder has been introduced by Curtis Machine Corp. The unit, produced in Germany for the company, is said to be the only one of its kind having a serrated rubber contact belt.

Unit is equipped with two-speed motor, platen, and contact roll.

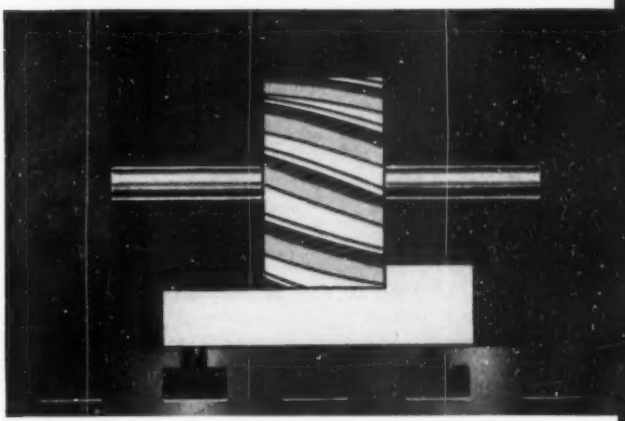
Curtis Machine Corp, Jamestown, NY

HOW TO END DAMAGED WAYS, PRODUCTION LOSSES

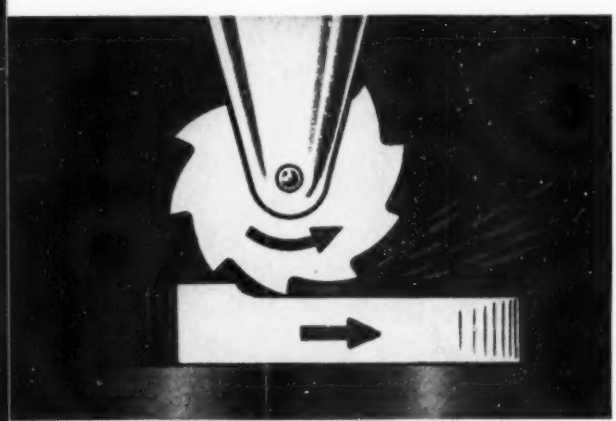
Sunoco Way Lubricant Stops "Jumpy Table"



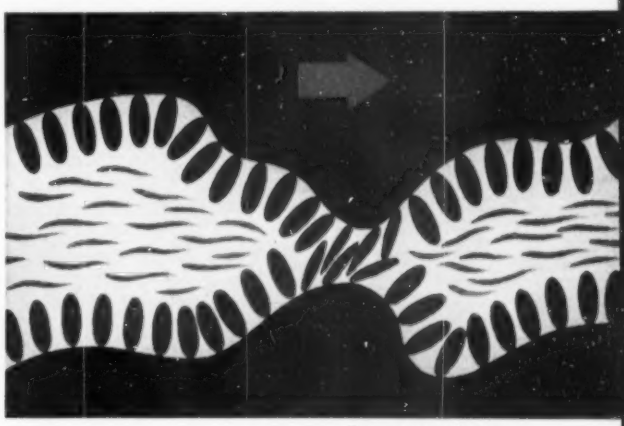
Tool chatter and jumpy table are machining headaches. Too often they cause poor surface finish, failure to hold tolerances, production losses.



Tool chatter is a result of a lack of rigidity in either the machine or the set-up. It is a mechanical problem and no lubricant can lick it.



Jumpy table is a stick . . . slip . . . stick . . . slip action of the table. It is a lubrication problem. Though just as damaging as tool chatter, it is not always detected when the cause of poor surface finishes.



Extreme magnification

Sunoco Way Lubricant cures jumpy table. It contains special compounds that form a film, like the nap of a rug, on the sliding surfaces and minimize the force of both static and kinetic friction.

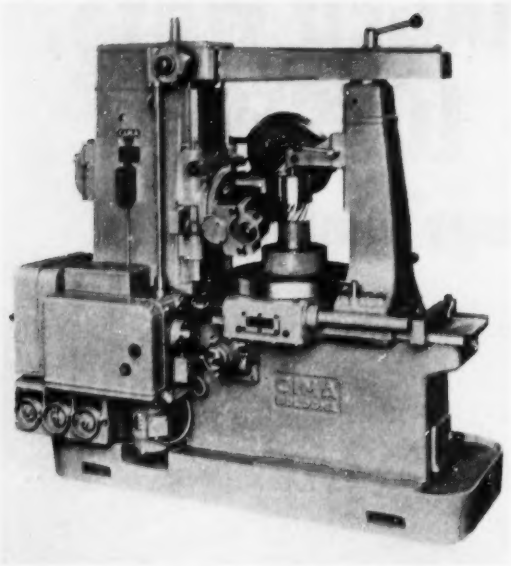
Why take a chance of damaging your ways? These integral parts of the base casting for your machine are difficult to refinish and costly to replace. For information about Sunoco Way Lubricant, call a Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-10.

INDUSTRIAL PRODUCTS DEPARTMENT

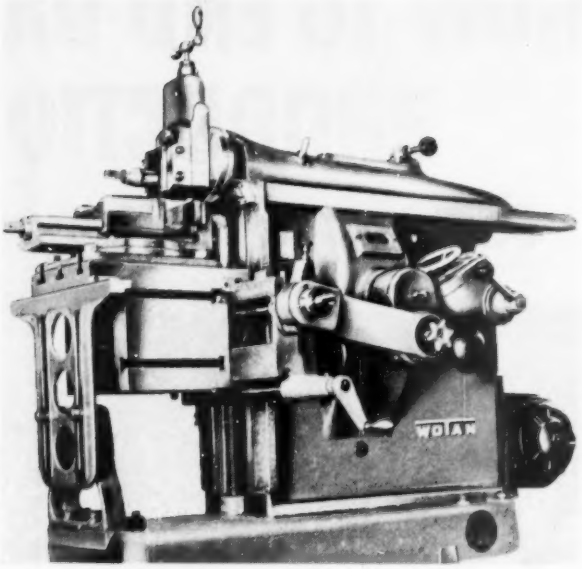
SUN OIL COMPANY

SUNOCO®

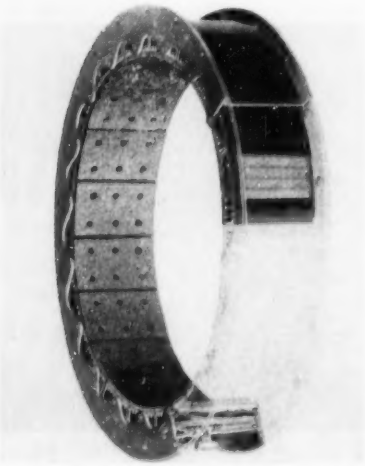
PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL



CIMA UNIVERSAL PRECISION GEAR HOBBER will cut spur, helical, spiral, and worm gears and incorporates differential mechanism said to eliminate difficult calculations. Max pitch capacity is 5 DP; max dia capacity for spur and worm gears is 20 in.; max width of gears, 11 in. Max distance between cutter and work arbors is 11½ in. Speed range of hobs is 50, 67, 76, 93, 101, 114, 124, 174, and 212 rpm — *Imported by Georg Scherr Co, Inc, 200 Lafayette St, New York 12, N Y*



HERCULES 16-IN. SHAPER ram stroke varies from 1¼ to 16 in. and six stroke speeds vary from 24 to 152 per min. The worktable travel (vertical or horizontal by power or hand) is 13¾ in. Six feeds range from 0.01 to 0.06 in. Vertical travel of tool head is 6½ in. Swivel vise jaws open to 8 in. Table surface is 15½x10½ in. All internal moving parts and ram ways are automatically lubricated. All driving gears are located inside the column and slide on multiple-spline shafts milled from solid and then ground — *Imported by Parker Machine Co, Inc, Pioneer St, Brooklyn 31, NY*



Wide Range of Fawick Ventilated Clutches

Fawick clutch, for use on such equipment as presses, shears, press brakes, and forging machines, is completely ventilated unit of rigid type providing for transmission of power from friction shoes through torque bars to metal side plates of assembly.

New clutch, type VC air-ring, is said to be unmatched for heavy-duty service with high starting loads and sustained slippage where generated operating heat lowers clutch efficiency and shortens operating life.

Design features include: cooler operation inherent in drum-clutch design plus isolation of rubber-and-cord tube from heat-generating friction surface; riveted, replaceable friction lining; and loose, expanding tube which is replaceable without removing clutch from shaft.

Clutch is manufactured in sizes ranging from 11.5- through 42-in. drum diameters with torque capacities ranging from 27,000 to 380,000 in.-lb.

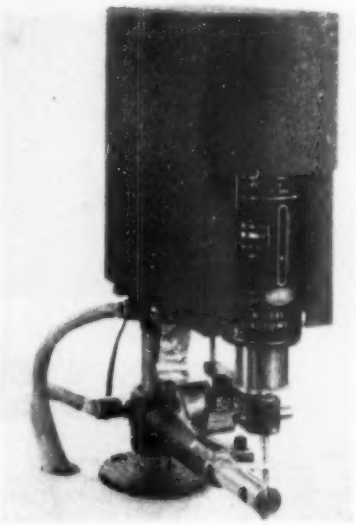
Federal Fawick Corp, 9919 Clinton Rd, Cleveland 11, Ohio

Cutting Tool Steel

Tool steel, known as Firth V C, is said to be a high-speed steel combining toughness with great abrasion resistance.

Method of balancing alloying elements results in the formation of the greatest possible amount of intensely hard vanadium carbide, according to the manufacturer. These numerous carbides, having a hardness equivalent to Rockwell C 84, embedded in a tough, low-alloy matrix, give the steel its high shock resistance and cutting ability.

Firth Sterling, 3113 Forbes St, Pittsburgh 30, Pa



WELDING HEAD, ILS, replaces former G head in Weldpower line and is reported to have increased efficiency. Head is designed for use with model 225A control unit. Press type and foot-operated, unit is equipped with accurate pressure and follow-up controls, as well as visual pressure scale. Lower electrode may be used on horizontal or vertical plane — *Raytheon Manufacturing Co, Waltham 54, Mass*

"Machining leaded steel at 238 SFM posed a tough problem!"...

One of the largest machine shops in the South, doing government ordnance work, was experiencing difficulty with tool burning, build-up and poor finish of product. Several major oil companies were finally called in for recommendations.

Horace Lane, a Sinclair Lubrication Engineer, studied the problem which involved machining leaded steel at 238 surface feet per minute!

Mr. Lane reports, "The solution depended on finding an oil light enough to carry off the heat, but with enough extreme pressure characteristics to withstand the heavy cutting, boring and threading – and still obtain an extremely high finish."

Mr. Lane continues, "Basing my recommendation on previous experience, I suggested Sinclair ORBITOL® Cutting Oil because of its high film strength and anti-weld properties. The company agreed to a trial run – *and* ORBITOL *turned the trick*. Not only was tool life lengthened, but production was substantially increased and product finish easily met required specifications."

Why not give a Sinclair Lubrication Engineer the chance to help solve your lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

Special Face or Tool Grinder

Planematic face or tool grinder, designated Type C, has a 5-hp motor inside the base with multiple V-belt drive to grinding spindle which permits movement of wheel to or away from work without disturbing belt alignment.

Grinding spindle is equipped with precision ball bearings and accommodates a 14-in.-dia Type 2 cylinder steel back wheel, or segment wheel. Coolant is supplied to wheel without spray or splash. Starting equipment with three-pushbutton station provides for clockwise or counter-clockwise wheel rotation.

The 8x21-in. table has 6-in. travel, crank handle adjustment, graduated dial for tilting from 3° above to 30° below the horizontal, rigid table lock and pinion drive with ratchet adjustment. Table, with anti-friction bearings, taper gib, and large reservoir with built-in self-actuating pump for automatic lubrication to all parts, is available for either manual or hydraulic traverse.

Standard Electric Tool Co, Cincinnati 4, Ohio

Conveyor for Grinding and Polishing Attachment

Conveyor for use with a grinding and polishing attachment has been designed to permit the application of production line techniques with polishing and back-stand equipment.

Unit is made in Germany for the company.

Curtis Machine Corp, Jamestown, NY

Thermocouple Circuit Failures Corrected by Sherman Restorer

Sherman restorer is a device for protection against incorrect heat control caused by failures of thermocouple circuits. Device can check for these faults and make automatic repairs for certain periods of time.

Pressing a button sends a pulse of electrical energy through the thermocouple circuit and bridges the loose, corroded, and defective joints.

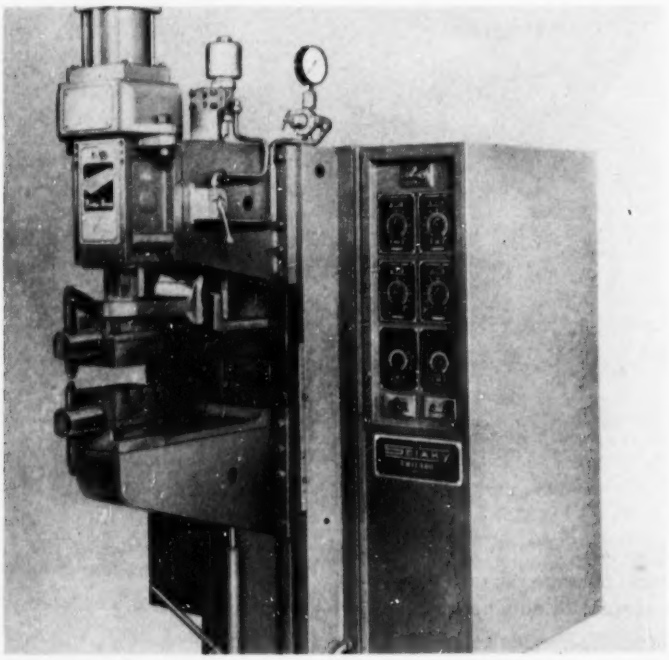
The Sherman Electric Co, Inc, 1807 Elm Rd, N E, Warren, Ohio

Contact Grinding And Polishing Units

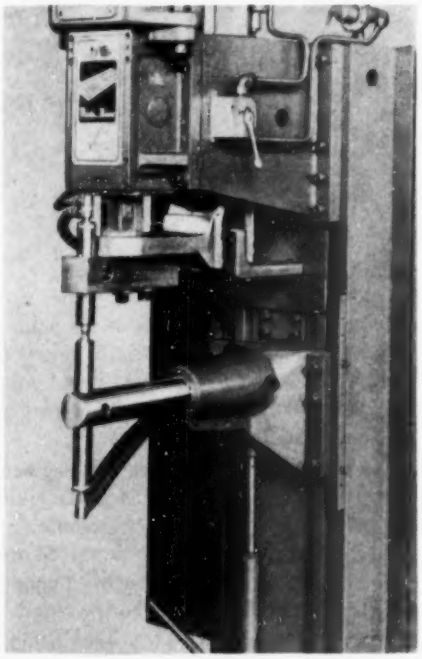
Four models of contact grinding and polishing machines have been introduced by Curtis Machine.

Completely integrated, pedestal-type, double-end, abrasive-belt contact units are produced for the company in Germany. Mounting permits the back-stand extensions to swivel 90°, and provides maximum utilization of floor space.

Curtis Machine Corp, Jamestown, NY



EPT 2 PROJECTION WELDER is a 3-phase unit available in 50, 75, and 100 KVA at 50% duty cycle, in 12-, 18-, and 24- in. throat depths, max electrode force of 4000-lb. Can be supplied as combination projection and spot welder. ESPT 2 combination makes spot welds on large production runs on two thicknesses of clean mild steel in minimum gages of 0.020 in. and maximum of 0.203 in. Spot welds two thicknesses of stainless in min gages of 0.022 in., max of 0.125 in. Spot welds aluminum and other light alloys, min, 0.025 in., max, 0.102 in. — *Sciaky Bros, 4915 W 67th St, Chicago 38, Ill*



SPT 2 SPOT WELDER, available in 50, 75, and 100 KVA at 50% duty cycle, from 18 to 60-in. throat depth; 1500 to 4000-lb max electrode force. Welds on two thicknesses of clean mild steel in min gages of 0.020 in., max of 0.102 in.; stainless in min of 0.020, max of 0.062 in.; aluminum, min of 0.025, max of 0.072 in. — *Sciaky Bros, 4915 W. 67th St, Chicago 38, Ill*

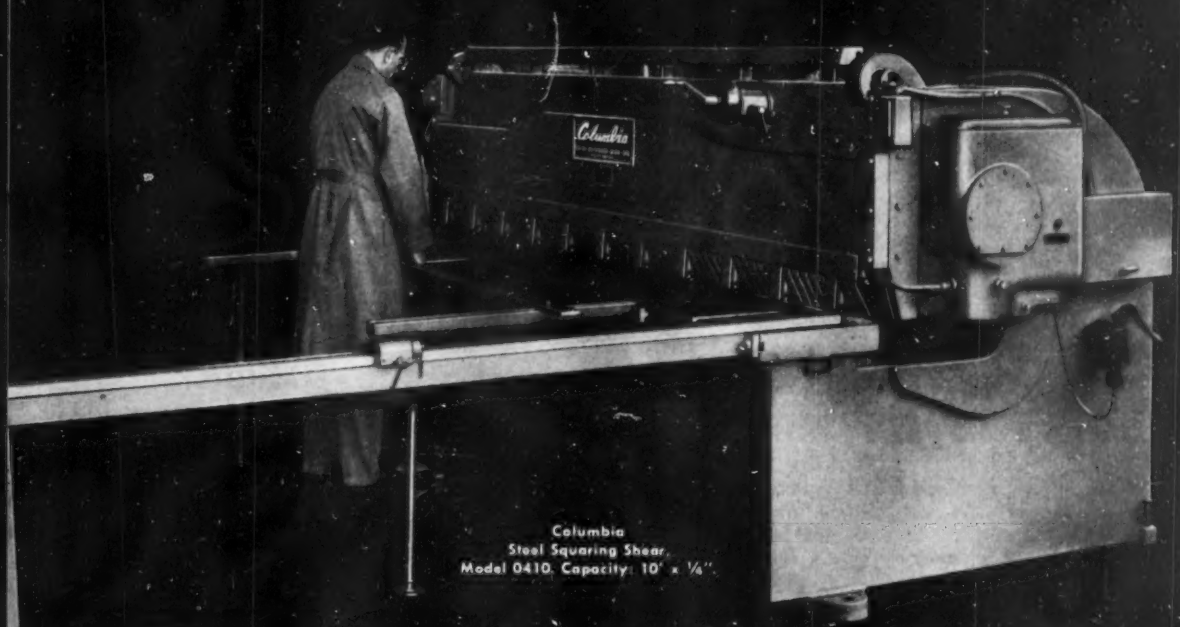
STEEL SQUARING SHEARS

TAILORED FOR YOU!

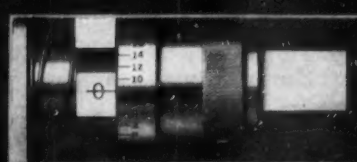
Columbia "New Series" steel squaring shears are quoted bare of all accessories. When you buy COLUMBIA you specify accessories which you will require, and you are charged only for the accessories which you specify.

In addition, the many exclusive features of Columbia Shears can be had in no other make.

The Blade Clearance Indicator, for example, makes blade clearance adjustment an "operator function." Simplifies and speeds quality shearing without the assistance of supervisory personnel. This new-found ease of making blade adjustments leads to accurate blade clearances regardless of how frequently material specifications change.



Columbia
Steel Squaring Shear,
Model 0410. Capacity: 10' x ¼".



Blade Clearance Indicator—By means of this device, accurate blade clearances can be achieved by the shear operator. This eliminates the necessity for calling in supervisory personnel to make these simple adjustments.

Other exclusive Columbia features are explained in detail in our FREE Bulletin No. 5321. Write for it, and the name of your nearby Columbia Dealer, *today!*

Address: Columbia Machinery and Engineering Corporation, Hamilton 2, Ohio.

new series **Columbia** STEEL SQUARING SHEARS and POWER PRESS BRAKES

Automatic Controller Regulates Furnace Dew Point Electronically

Automatic controller which regulates atmosphere dew point in controlled-atmosphere metal-treating furnaces, is a self-contained unit which operates electronically, continuously recording and controlling furnace dew point.

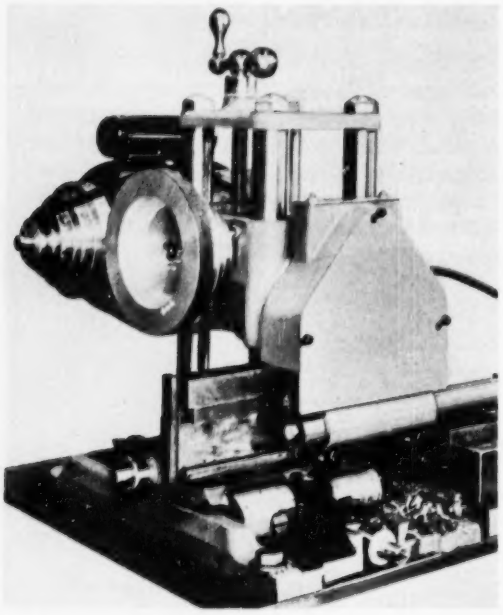
Adjustable to meet any required dew point within the capacity of the particular furnace to which it is attached, the controller pumps furnace atmosphere through a 5/16-in. steel tube. Water is condensed by means of a cooling element on a measuring device; this condensation temperature is measured electrically, then indicated, recorded, and controlled.

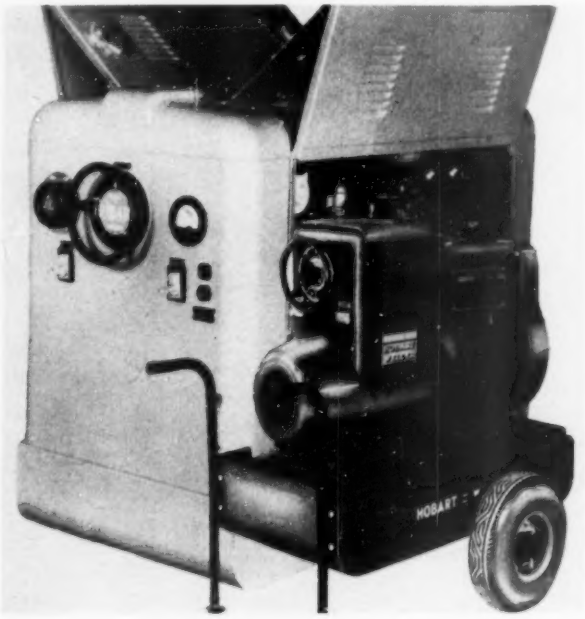
Because of the relationship between dew point of the atmosphere and its carbon potential, automatic control of furnace dew point is said to assure bright, scale-free results in a wide variety of heat-treating operations including carburizing, carbonitriding, carbon restoration, annealing, normalizing, and hardening.

Electronics element of the unit is replaceable, and easily changed. Continuous written record of furnace atmosphere dew point is charted on a graph located on face of the instrument, as well as a scale with range of from –60 to +90 F for settings which are made by turning an indicator.

Cabinet of the 285-lb unit measures 13x24x72 in. Separate control valve is easily attached to regular atmosphere control panels.

Ipsen Industries, 715 S Main St, Rockford, Ill





Internal Keyseater and Shaper Added to Versa-Mil Line

Keyseater adds reciprocating tool action to range of precision machining offered by Versa-Mil. Device can be used as portable independent tool.

Keyseater will cut internal keyways from ⅛ to 1 in. in width, in bores from ½-in. diameter to any required size. Device can be set on lathe carriage so keyway can be cut in same setup in which hub is bored; also used as portable slotter or shaper and as bench shaper. Operation is normally as draw shaper but where accessibility is limited, as in a blind keyway, change of toolholder and switch will adapt it for push shaping.

Stroke is adjustable from 0 to 5 in. in length and full 360° in angle. Interchangeable heads provide clapper action which relieves toolbit on return stroke.

Oil reservoir provides automatic lubrication for every rotating and sliding surface. Dovetail slide, which guides stroke, is adjusted for fit by a tapered gib. Rocker arm and all toolholders are hardened steel. Toolbar is carburized, hardened and ground on outer surface and has tapered socket for toolholders. Ram, slide ways, and gib are hand-scraped.

It is claimed that rigidity and close fits combine to produce cuts controlled to tolerances within 0.001 in.

Versa-Mil Co, 33 W 42nd St, New York 36, NY

Engine-Driven Arc Welders

Hobart Bros air-cooled gasoline-engine-driven arc welders are 200-amp units. Two models are available: one is a dc unit powered by a two-cylinder engine and compactly designed (38 in. long by 21¼ in. wide by 35-5/16 in. high); the other is a combination ac arc welder and 5-kw ac power unit driven by a four-cylinder engine. Portable mountings are available for both models. Engines are air-cooled Wisconsin units.

Throwing switch to "welder" makes unit function as ac arc welder; throwing switch to "ac power" converts generator into single-phase, 110-v, 60-c power plant of 5-kw capacity.

The Hobart Brothers Co, Troy, Ohio

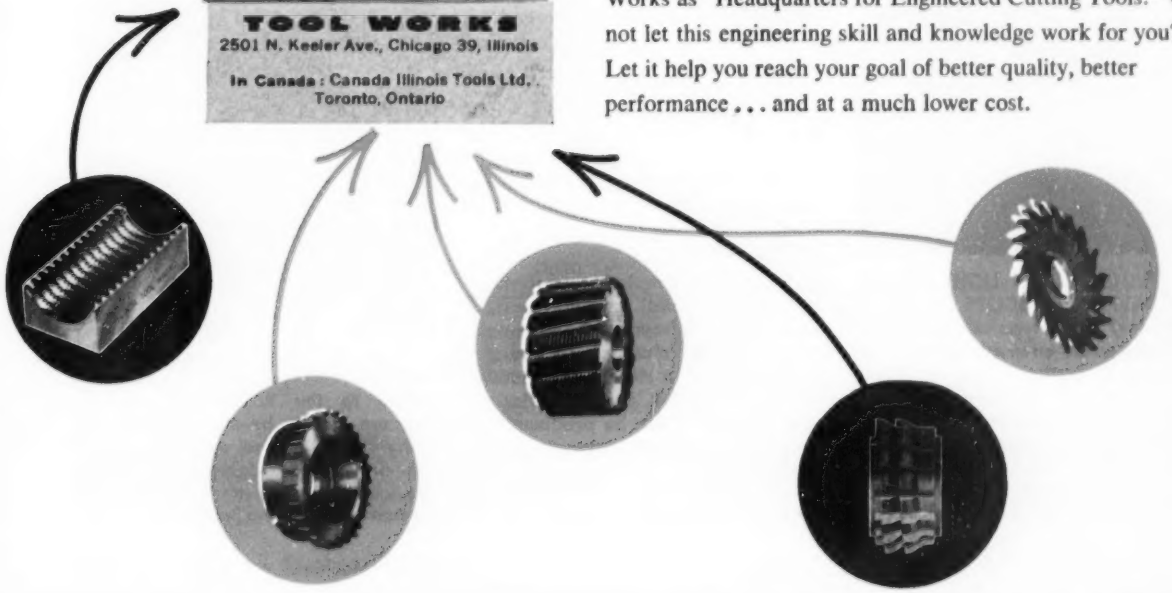
Performance counts in cutting tools, too!

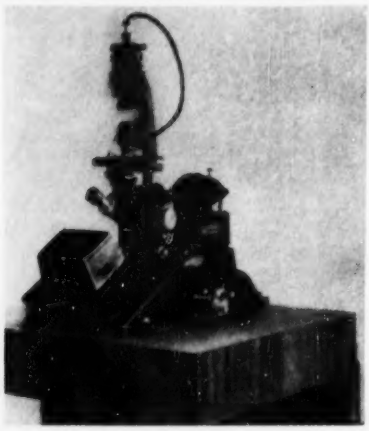
ILLINOIS

TOOL WORKS
2501 N. Keeler Ave., Chicago 39, Illinois

In Canada: Canada Illinois Tools Ltd., Toronto, Ontario

One look at the championship record of Illinois Tool Works' cutting tools tells you that's the "team" that can't be beat. Here is real performance! More than forty years of leadership based on the pioneering of metallurgical and production techniques . . . a fact that has established Illinois Tool Works as "Headquarters for Engineered Cutting Tools." Why not let this engineering skill and knowledge work for you? Let it help you reach your goal of better quality, better performance . . . and at a much lower cost.





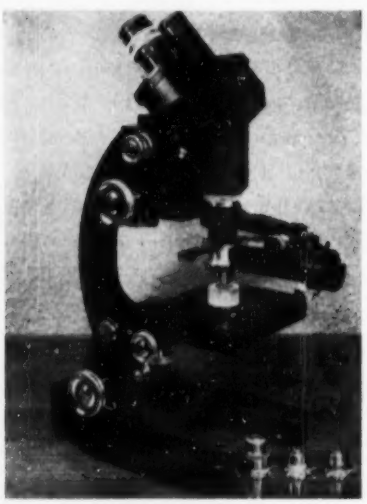
Universal Galileo Microscope Designed For Speed and Comfort

Galileo microscope is said to be particularly impressive due to speed with which observer can perform various operations of microscopy. Magnifications from 4 to 3000 can be run with continuity on ground glass screen of camera. Without recentering, magnification of any objective setup can be instantly decreased or increased four times. Macro-photography can be done down to 5X without disturbing specimens.

Tube arrangement with bayonet mounting of accessories permits observer to make quick changes while studying specimen. Eyepiece viewing and photographing on both still and movie camera can all be done at same time. Fourth operation, projection up to 20 ft on a 40-in. screen can also be simultaneously performed when light is used.

Microscope tube splits into three trunks, into each of which may be inserted the accessories for polarizing, dark ground, and grazing light. Two independent light sources are provided, one for transmitted light and other for reflected light. Square mechanical stage with precision graduated movements and full research rotating and translating mechanical stage with rotations reading to 10 min and orthogonal movements reading to 0.1 mm, as well as stages for special techniques, are available.

Imported by Opplem Co, 352 Fourth Ave, New York 10, NY



COOKE INCIDENT LIGHT PHASE CONTRAST MICROSCOPE is said to be the only bench-type microscope offering the phase contrast technique of observation. Further claim is made that it is only instrument of any type offering instant interchange between bright field, dark field, positive phase contrast, and negative phase contrast — *Imported by R Y Ferner Co, Inc, 110 Pleasant St, Malden 48, Mass*

Ductile Iron Bar Stock Has No Centerline Shrinkage

Ductile iron bar stock, said to be sound from one end to the other and able to pass X-ray inspection for density, is being produced by Howard Foundry. Bars are supplied in 12-in. lengths in round sizes of 1¼, 1¾, 2¼, 2¾, 3⅜, 4⅜, and 6 in.

As-cast average properties are 100,000-psi tensile strength, 65,000-psi yield, 3½-4½% elongation, and 245 Brinell hardness. Bars can be heat-treated for greater elongation and hardness.

Ductile iron machines very well and has excellent anti-friction qualities due to graphite still in matrix after inoculation of magnesium.

Howard Foundry Co, 1700 N Kostner Ave, Chicago 39, Ill

Thermobalance

Chevenard thermobalance continuously weighs small samples throughout a heat-time cycle and automatically records changes in weight. Temperatures in range up to 1100 C can be obtained and any desired heat-time cycle can be produced. Instrument is useful in corrosion studies.

Imported by R Y Ferner Co, Inc, 110 Pleasant St, Malden 48, Mass

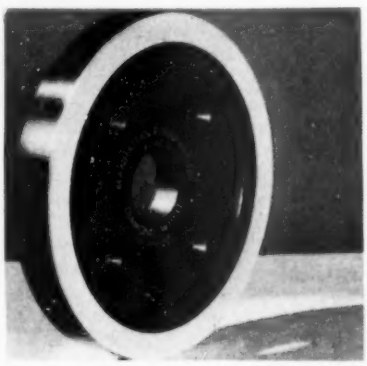
Abrasive Cutoff Machine Uses 18-in. Disk

Radiac cutoff machine was designed for economical and accurate cutting of bars, tubing, and formed shapes. It is said that rigid construction, coupled with precision machining, results in economical operation.

Machine is equipped with quick-acting, hand-operated vise. Work is held on both sides of cut under spring tension. Hand lever for releasing spring tension is used only when locating or removing work from vise. Either of two vises is standard equipment. One is for straight cuts and jaws open from 0 to 3.5 in. The other is for straight and angle cuts up to 45° and jaws open from 0 to 2 in.

Capacity of machine is 2.5-in.-dia solid metal and 3.5 in. tubing. Spindle runs in ball bearings at a speed of 2500 rpm or less.

A P DeSanno & Son, Inc, Phoenixville, Pa



METAL-BONDED DIAMOND WHEELS added to the Raybestos-Manhattan line, are said to be more efficient for many diamond-wheel uses; lens grinding and glass edging are typical applications — *Raybestos-Manhattan, Inc, Manhattan Rubber Div, Passaic, NJ*

MOREY offers

DAVID BROWN-MUIR

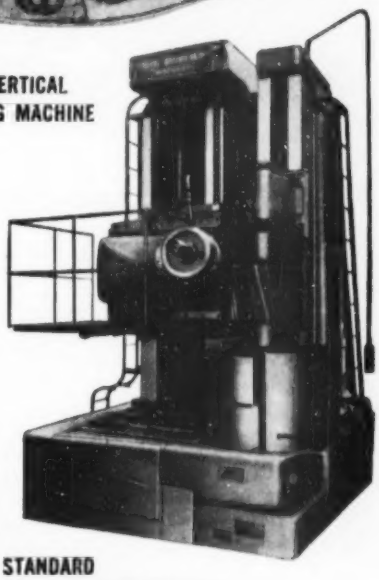
Outstanding

GEAR & SPLINE HOBBING MACHINES

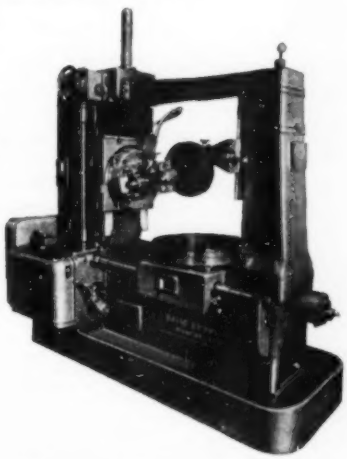
- Highest degree of maintained accuracy
- Extreme rigidity under production stress
- Maximum productivity
- Economy of operation

PROMPT DELIVERY

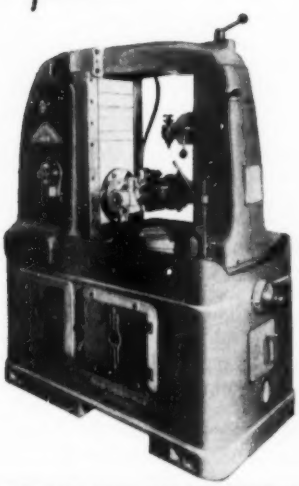
GEAR HOBBING MACHINE
Model MH
75-100-150-200



24 and 36 VERTICAL
PINION HOBBING MACHINE



STANDARD
GEAR HOBBING MACHINE
Model MT 15



STANDARD GEAR HOBBING MACHINE
Model MT 30

The David Brown-Muir range of machine tools for the production of gears, splines, serration and sprockets includes Moving Table Hobbing Machines up to 60" dia., Moving Head Hobbing Machines up to 200" dia., Spline Shaft Hobbing Machines up to 35" between centers, Chucking, Testing and Crossed Axis Gear Shaving Machines up to 200" dia.

For full details and specifications on any of these machines, write, wire or phone today!

MOREY ...for machine tools!

MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
410 BROOME STREET • NEW YORK 13, N. Y.
CANAL 6-7400 • CABLE ADDRESS: WOODWORK, N. Y.

Agitator on Sub-Zero Unit Speeds Chilling Process

Sub-Zero Model R-120 chilling machine is equipped with an externally mounted agitator which speeds and controls the flow of convection fluid in the chilling chamber to effect more rapid heat transfer.

Unit, particularly adaptable to large scale production needs, operates at temperatures from –70 to –150 F. Normal operating temperature is –120 F with a heat absorption capacity of 2000 Btu's per hr.

All-steel cabinet is 45x72x43 in.; chilling chamber is 18x30x33 in. deep, with 22 sq ft of freezing surface; capacity, 75 gal., or approximately 10 cu ft. Insulation is 4-in. of Santocel; design eliminates condensation of moisture and keeps exterior dry in any climate. Operates with two motors, 1 hp and ¾ hp 220/440-v, 60-c, three phase. Weight, 1500 lb.

Sub-Zero Products Co, Reading Rd at Paddock, Cincinnati 29, Ohio

Clausing Heavy-Duty Lathe Has 1-in. Collet Capacity

Heavy-duty lathe has been introduced with a 1-in. collet capacity, and a 1⅜-in. bore.

The 16-in.-long spindle has 8 in. between Timkin zero-precision-tapered bearings for accurate cutting under maximum loads. Made of precision-ground forged steel, it is mounted in a 45-lb grey-iron headstock casting, designed to take all thrust and radial loads while maintaining alignment of headstock bearings. Malleable iron countershaft bracket, screwed and permanently doweled to headstock casting, bridges the drive opening for increased rigidity.

Headstock has clutch and brake equipped countershaft drive. Tailstock is bored for No. 3 Morse taper. Swing over ways is 12¾ in; over saddle, 7½ in. Maximum length between centers is 36¼ in.

Clausing Div, Atlas Press Co, Kalamazoo, Mich

Metal Working Electrode For Quick Pre-Heating

ThermoTrode is inserted in ordinary electrode holder of DC arc welder and used, not for welding, but as source of instant heat. Steel core electrode features a patented flux said to establish a unique type of arc. Metal is oxidized with searing blast that disintegrates core metal into a powder.

ThermoTrode can be used for preheating base metal or heating after welding to relieve stresses. Available in ⅛-, 5/32-, and 3/16-in. dia.

Eutectic Welding Alloys Corp, 172nd St & Northern Blvd, Flushing, NY

Dust Filter Unit Provides Continuous Uniform Suction

Sly No. 6-C Dynaclone dust filter draws in dust-laden air from the source, and cleans air by passing it through the fabric of cloth filter bags. Dust is collected on the outside of the bags. To remove it, so that it is deposited in the hopper below the casing, a traveler moves continuously back and forth across the open ends of the bags, introducing clean, atmospheric air in a reverse direction which blasts off accumulated debris.

Principal advantage of the unit is said to be the high efficiency attained by continuous cleaning of filter bags by reverse airflow, thus eliminating intermittent mechanical vibration of bags. Continuous cleaning also provides uniform suction at dust source, important in some process applications.

Filter requires minimum overall height and floor space, because of compact arrangement of bags.

W W Sly Manufacturing Co, 4700 Train Ave, Cleveland 2, Ohio

Temperature Controller Is Portable Unit

West portable temperature controller reportedly accomplishes precision control by plugging instrument into wall and plugging unit to be controlled into instrument. Then, by inserting instrument thermocouple into an oven, bath, or thermocouple well, true temperature will be indicated by upper pointer and may be controlled by setting lower pointer to correct scale position by means of external setting knob.

Two power outlets provide versatility by enabling unit to control blowers, fans, and agitators as well as temperature. Thermocouple break protection is provided as standard.

All models have dual scale range of 50 to 500 F, iron-constantan, and 0 to 2000 F, chromel-alumel, with selector switch to operate on one range or other. Unit is available in three models: JE, JEP, and JEL.

West Instrument Corp, 525 N Noble St, Chicago 22, Ill

75 Horsepower Century drip proof motor on a copper tube drawing machine.

Century Motors'

Unusual Freedom from Vibration Helps Maintain Close Tolerances— With a Minimum of Rejects

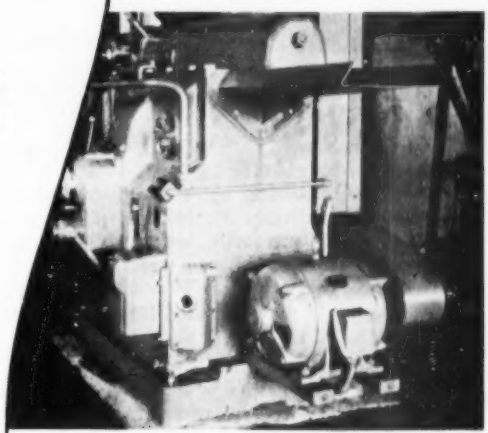
Century motors are designed to help you get the accuracy that was built into your modern production machines. They are ruggedly built, carefully machined and well balanced both mechanically and electrically. Century motors are widely known for their unusual freedom from vibration.

Century motors have wide acceptance from BIG NAME machine tool manufacturers because they mount squarely and solidly and operate with smooth, quiet precision.

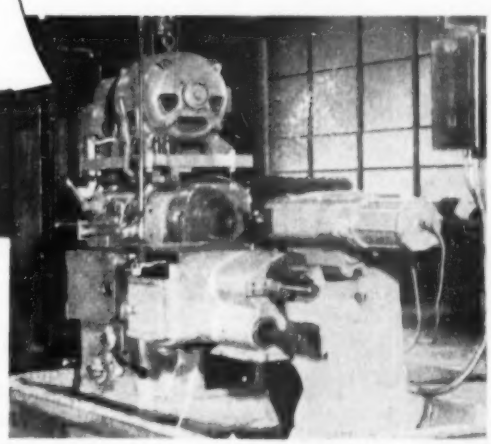
You may select Century motors in: open drip proof — splash proof — or totally enclosed fan cooled construction to assure uninterrupted production against various atmospheric hazards.

The complete line of Century motors permits selection of the right motor to meet the requirements of your machines. They are built in a wide range of sizes from 1/8 to 400 horsepower. Specify Century for all your equipment.

CENTURY ELECTRIC COMPANY
1806 Pine St., St. Louis 3, Missouri
Offices and Stock Points in Principal Cities



7½ Horsepower Century drip proof motor on a crank shaper in a tool room.



7½ Horsepower Century drip proof motor on a special production lathe.

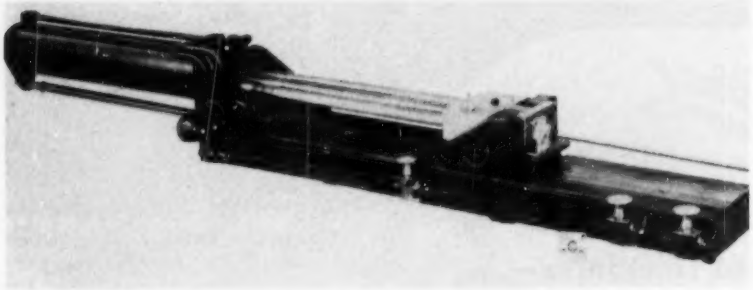
Century SERVICE
Is Near Any CENTURY Motor Driven Equipment

Prompt Service is offered by CENTURY'S National Network of more than 200 Authorized Service Stations, supervised by 28 Century Sales offices.

1. Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.
2. CENTURY Authorized Service Stations are qualified and equipped to service and repair any piece of CENTURY apparatus.
3. Genuine CENTURY renewal parts are available at CENTURY Service Stations, CENTURY Parts Distributors and at the factory in St. Louis.

Century C MOTORS

New Shop Equipment



Air-Powered Fixture Broaches Holes, Keyways, and Contours

National Broach & Machine Co air-powered broaching fixture was designed to cut broaching equipment costs and speed delivery. Horizontal self-contained fixture will broach holes, keyways, and contours on wide variety of production parts.

Fixture consists of cast-iron base with two integral vertical flanges. A 5-in.-dia air-hydraulic cylinder having 25-in. stroke is mounted on a flange at one end of the base. Other flange, in middle of base, supports the work rest plate. Two guide bars supported by the two flanges guide an automatic broach puller mounted on end of air cylinder rod.

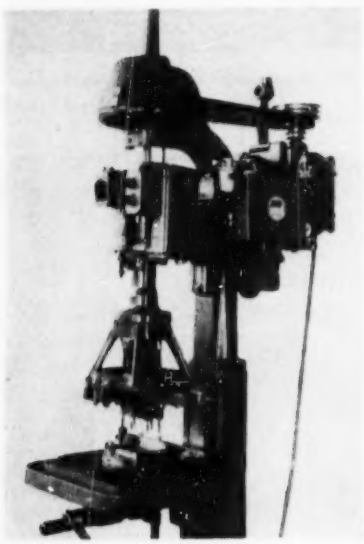
Linear ball bushings are provided in the puller-head guide holes to promote long wear life and reduce friction loads. A four-way valve mounted at the cylinder end of the fixture controls air cylinder travel through the action of three manually controlled pilot valves located at the right of the fixture plate.

In operation, part is placed on work rest plate and broach inserted through part into puller. Then two pilot valves (No. 1 and No. 2) are simultaneously depressed, causing air cylinder to pull broach through part. After part is removed from rest plate, two pilot valves (No. 1 and No. 3) are depressed, causing air cylinder to return broach through fixture and release it for removal before beginning broaching cycle again.

Cycle time to rough and finish close-tolerance valve spool hole broach in tractor part illustrated is 15 sec.

Broaching fixture has 1400-lb-broach pull capacity with 80-psi air-line pressure. Rate of broach travel is adjustable through a control valve in hydraulic end of cylinder. Broach centerline is 3½ in. above work surface at rear of rest plate. Fixture is 89 in. long, 12 in. wide, and 10 in. high. Weight is 600 lb.

National Broach & Machine Co, 5600 St Jean, Detroit 13, Mich



Air-Thrust Drilling and Tapping Machines

Two models (C-16: drilling and C-16-T: drilling and tapping) of the new Beckett-Harcum machines are available with electrically controlled air-powered thrust. Both models are available as box-column, floor-stand type, having sliding head and adjustable work table, and as bench and table multiple unit combinations having two-, three-, and four-head units.

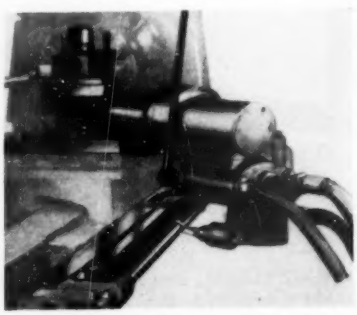
C-16-T performs single and multiple tapping direct from the drill chuck or standard multiple drill head, without employing clutch or leadscrew. When pre-determined depth of stroke is reached, spindle starts to ascend at same instant motor is reversed and tap leads out without stripping last thread. Class 4 fit can be produced in aluminum.

By switching out the motor-reversing controls, drilling operations can be performed and the same fixtures used for tapping by removing the drill bushings.

Both models are equipped with dual air cylinder transmission, located vertically on either side of the quill housing, which provides fast approach, correct feed, and max cutting efficiency. Speeds and thrust are infinitely variable.

Max thrust of 980 lb at 100 psi is obtainable and stroke length of 4 through 6 in. Drilling capacity is ¾ in. in mild steel. Tapping capacity is 1 in. NC using 1-hp motor. Spindle is equipped with No. 3 Morse taper with No. 2 available.

The Beckett-Harcum Co, Inc, Wilmington, Ohio



BONDYCOP HYDRAULIC COPYING ATTACHMENT for lathes (AM—June 9 '52, p194) is now available in two sizes—3¼ in. for lathes from 10 to 13 in. swing, 6 in. for lathes with 14 to 20 in. swing. Three basic parts of unit are motor-driven hydraulic pump, templet holder, and hydraulic slide with toolholder — *Morey Machinery Co, Inc, 410 Broome St, New York 13, NY*

ALEMITE OIL-MIST

It saves Hoover $3670 in 15 months!

eliminates bearing failures... slashes maintenance costs!

The Hoover Company, the world's oldest and largest manufacturer of electric cleaners, recently faced a rash of costly repairs on key machines in their North Canton, Ohio plant. Replacement parts and labor ran excessively high . . . down-time mounted . . . production schedules lagged.

To help solve these problems *quickly*, an Alemite "Friction Fighting" specialist was called in to work with plant engineers. After careful study and analysis, Alemite Oil-Mist Systems were recommended and installed.

Results were astounding!

Universal joints on a drilling machine, *formerly replaced every 10 days*, have been giving trouble-free service for 15 months! . . . Savings—$2250!

Maintenance costs due to overheating on another high speed machine—*ended!* . . . $900 saved!

Bearings, previously replaced every 4 months on a polishing machine, *are still on the job after 10 months* . . . Again, a saving—$520!

Parts spoilage drastically cut! Oil traces, as revealed under black light inspection, *eliminated!*

Facts prove this *"Friction Fighter"* most efficient, continuous, fully automatic lubrication system

Industry everywhere relies on Alemite—the world leader in lubrication methods. Oil-Mist, one of Alemite's greatest developments, is the system that *atomizes* oil into mist—distributes it through tubing to bearings—bathes all surfaces with a cool film of clean oil. A miracle of efficiency, Oil-Mist has no moving parts—eliminates the human element. Proved *on the job* in numerous applications throughout industry, Oil-Mist uniformly maintains oil film on plain and anti-friction bearings, gears and chains—despite variations in load, temperature or speed. Why not get the facts on Alemite Oil-Mist—*today?*

ALEMITE OIL-MIST Lubricates All Types of Mechanisms

Alemite OIL-MIST Lubrication

A PRODUCT OF SW STEWART-WARNER

Compare all these OIL-MIST advantages with *ordinary* methods!

- Reduces bearing temperatures as much as 20%.
- Continuous, uniform lubrication of all types of bearings.
- Air pressure seals bearings against dirt.
- Reduces oil consumption—up to 90%.
- Prevents product spoilage.
- Eliminates guesswork—each bearing picks up as much Oil-Mist as it needs.
- Reduces starting and running torque.

Get the facts NOW!

Alemite, Division of Stewart-Warner, Dept. C-103
1850 Diversey Parkway, Chicago 14, Illinois

☐ Please send me a FREE copy of your new and complete OIL-MIST catalog.

☐ Please have your Alemite Lubrication Representative arrange a desk-top demonstration of OIL-MIST. This entails no cost or obligation on my part.

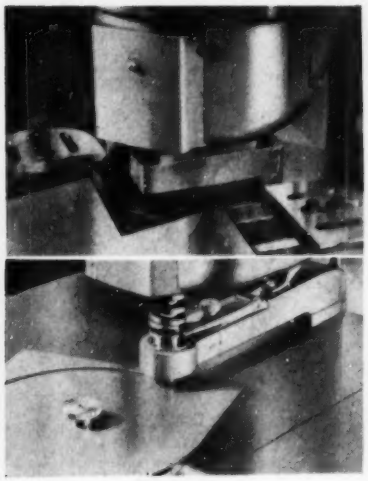
My name .....

Title .....

Company .....

Street .....

City ..... State .....



Wales Sheet Metal Fabricator Punches, Notches, and Nibbles

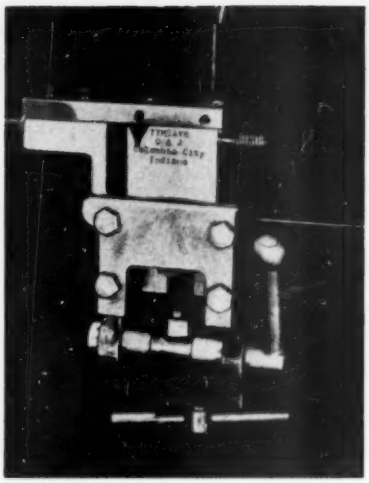
Sheet metal fabricator, Model 10-AA, features an improved Hydra-New-Matic head said to operate with minimum vibration and noise at 165 strokes per minute for single-hole punching and for nibbling.

Rapid interchangeability for punching, notching, or nibbling is claimed as one of the outstanding features of the new model. Operators work from blueprints or operation sheets without requiring templets. The holder permits 10-sec changing of punches and dies for punching various round and shaped holes up to 1¼-in. dia. Also available is a holder with a 3½-in. capacity.

By placing a Wales notching unit on the bed table, notching operations are performed without ram adjustments. Notching units are equipped with built-in scales and gages adjustable up to 5 in. for corner notches. This is illustrated at the upper right.

All types of nibbling are possible. Nibble lever controls the non-repeat device for continuous, uninterrupted ram operation while nibbling. Illustration at lower right shows circle nibbling device equipped for pivoting from center hole in work.

Wales-Strippit Corp, 345 Payne Ave, North Tonawanda, NY

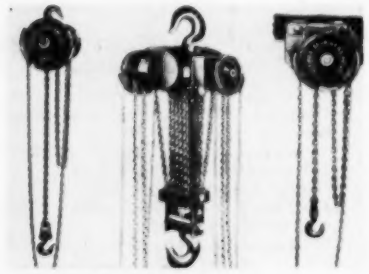


Work-Holding Fixture For Cross-Drill Operations

Cross-drill fixture, Tymsavr, can reportedly be quickly and securely attached to the swing table of ordinary drillpresses. Fixture has two drill hole positions in the bushing plate which accommodate standard hardened drill bushings. Bushings are interchangeable up to ⅜-in. drill-hole size.

An adjustable end-stop positions the work lengthwise and its move-back range allows holes to be drilled as far back as 1⅞ in. from the end of the work. Extra-long pieces to be drilled can be placed crosswise in the special V-channel cut across the regular V-block at the rear drill bushing position.

C & J Screw Machine Products, Inc, Columbia City, Ind



Coffing Adds New Units To Spur Gear Hoist Line

Coffing line includes 55 new models and sizes of Spur Gear hoists. Included are 15 sizes of single- and multiple-chain hoists with capacities from ¼ to 25 tons. For specialized applications, there are now plain and geared Army-type hoists, ¼ to 10 tons; low-headroom hoists, 1½ to 24 tons; and Clevis connected hoists.

Coffing Hoist Co, Danville, Ill

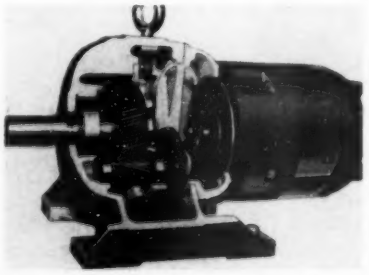
Air Motors Feature Low Air Consumption

Air motors feature an axial piston design that reportedly results in low air consumption. Motors are available with ratings from ½ to 2¾ hp, in twelve combinations of speed and torque.

Air consumption varies from 21 cfm in the smallest size motor to 83 cfm in the largest.

Keller Tool Co, Grand Haven, Mich

SOAPSTONE HOLDER weighs 3 oz and was designed to eliminate loss from soapstone breakage. Unit has automatic locking device which makes the soapstone adjustable to any length. Price: $1.49. — *See-Line Co, Inc, 618 Amarillo Bldg, Amarillo, Texas*



Century Gearmotors

Century Electric announced a new integral gearmotor series ranging from 1 to 15 hp. Motors are offered in wide range of speeds in single, double, and triple gear reductions. Gears meeting A G M A class I, II, and III specifications can be had to fit varying load requirements. Motors have constant or variable speeds.

Century Electric Co, 1806 Pine St, St Louis 3, Mo

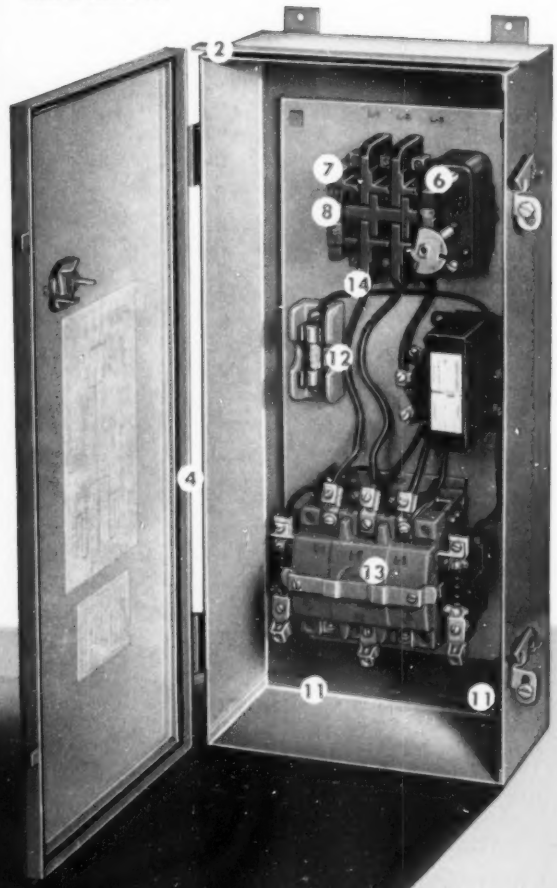
INDUSTRY ASKED for it...HELPED US DEVELOP it...

AND Here it is!

THE NEW TYPE "RAC" ARROW AH HART COMBINATION STARTER

NEMA TYPES I, IA and XII

SIZE 2 NEMA XII



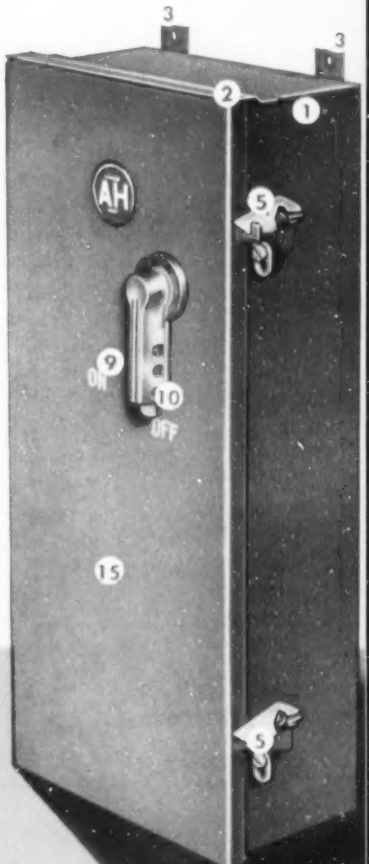
Features:

FOR NEMA XII

1. **HEAVY, SEAM WELDED CONSTRUCTION** . . . with no knockouts.
2. **OIL DRIP SHIELD** . . . prevents collected oil from dropping on starter when door is opened.
3. **EXTERNAL MOUNTING BRACKETS** . . . let oil drain down behind enclosure.
4. **OIL PROOF NEOPRENE GASKET** . . . retained by both cement and channel.
5. **AUTOMATIC LATCHES** . . . hold door securely even if locking screws are accidentally left loose.

FOR ALL-NEW DISCONNECT

6. **HEAVY SILVER CONTACTS** . . . for long life.
7. **CONTACTS COMPLETELY VISIBLE** . . . maintenance man can SEE that the Disconnect is off.
8. **CONTACT CARRIER INSTANTLY REMOVED** . . . for inspection or replacement.
9. **SIMPLE, SAFE, STURDY MECHANISM** . . . **COVER CAN'T BE OPENED WITH DISCONNECT ON** . . . handle must be turned to "Open" with Disconnect "Off".
10. **HANDLE PROVIDES FOR 3 LOCKS** . . . can only be locked in the "Off" position.



GENERAL

11. **ENTIRE COMBINATION REMOVABLE** . . . from box by merely loosening two non-removable screws.
12. **TRANSFORMER FUSED ON SECONDARY SIDE.**
13. **TYPE "RA" STARTER** . . . with exclusive "Right Angle" Operating Mechanism.
14. **ALL CONTROL WIRING *RED*** . . . **ALL LINE WIRING BLACK.**
15. **SMALLER SIZE** . . . Size 1 unfused . . . entire unit is just 15⅜" x 7½" x 4⅜".

ENGINEERED FOR SAFETY

NEMA TYPE XII built to JIC STANDARDS

TURN THE PAGE FOR ADDITIONAL INFORMATION

ENTIRELY NEW
OUTSTANDINGLY ADVANCED
EXACTLY RIGHT FOR INDUSTRY'S NEEDS

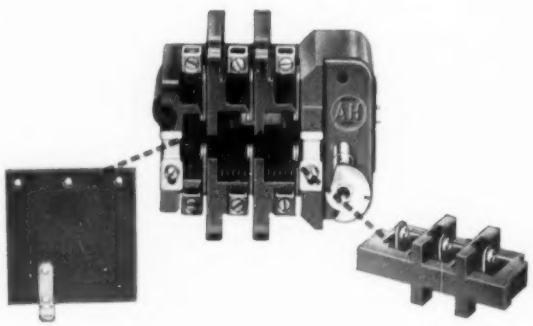
ARROW AH HART

TYPE "RAC" COMBINATION STARTER

Leading Machinery Engineers throughout industry worked with us to develop this all-new, "RAC" Across-the-Line Combination Starter. The NEMA Type XII is designed, engineered and constructed to meet all JIC Standards for Safety, Oil Tightness and Convenience in both operation and maintenance. In addition, the Type "RAC" offers smaller size plus new standards of electrical performance and dependability . . . possible only with the exclusive Arrow-Hart "RA" Starter Design.

Incorporating EXCLUSIVE "RA" DESIGN with All-New "RAD" DISCONNECT

The "RAD" Type Disconnect is a completely new, front operated design that offers many important advantages for both safety and convenience. The operating mechanism is simple and rugged with a safe "Off" position. The enclosure door of the "RAC" cannot be opened unless the operating handle is moved to the "Open" position and the Disconnect is off. The handle has provision for three padlocks and can be locked only in the "Off" position. The butt-to-butt type contacts of heavy silver are provided with a clip-on cover that may be used or not as desired. When this cover is removed, the contacts are completely visible for easy inspection . . . and to give the maintenance man an additional *visual* assurance that the Disconnect is off. The Contact Carrier . . . held in place by two swinging latches . . . can quickly and simply be removed entirely for fast, easy inspection, maintenance or replacement.



Available

- With GENERAL PURPOSE (NEMA TYPE I) ENCLOSURE
- With SEMI-DUST (NEMA TYPE IA) ENCLOSURE
- With OILTIGHT (NEMA TYPE XII) ENCLOSURE
- With DISCONNECT . . . Fused or Unfused Type
- With CIRCUIT BREAKER TYPE DISCONNECT
- REVERSING and TWO SPEED TYPES
- In NEMA SIZES 0, 1 and 2 . . . with Sizes 3 and 4 coming soon
- With or without CONTROL CIRCUIT TRANSFORMER

SEND NOW FOR COMPLETE INFORMATION ON THE TYPE "RAC" COMBINATION STARTER

AH

Industrial Control Division
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 Hawthorn Street, Hartford 6, Conn.

Please send me complete product literature covering:
☐ *Type "RAC" Combination Starters* ☐ *"RA" Motor Control Design Story*

NAME_____
POSITION _____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE_____ STATE_____

ARROW-HART
INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD 6, CONNECTICUT

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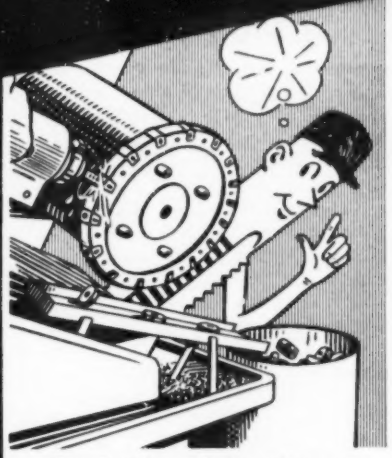
PRINTED IN U.S.A.

TAP-ODDITIES



Round and round the rotary goes
At mass production speed.
Pete sez: "For real economy —
Bath Taps are what you need!"

This go-cart — on the rotary plan,
Solved Pete's production woes.
His "wheel of fortune", spins around —
And where she stops — nobody knows!

In these days of long runs, "production tapping" is an art. Considerable study must go into the cycle and handling time.

1. The cycle is the time necessary to complete a full tapping stroke and is dependent on the spindle speed and the pitch of the thread. The only productive time, is while the tap is actually cutting the thread — therefore, the reversing speed is usually increased to a 2 to 1 ratio.

2. Handling time varies with the operator — or with mechanical factors, if the feed and discharge is automatic. Some threading jobs have a long handling time and a short cycle, while others may be just the opposite.

Study of the style of tap used is important — and Bath engineers are often able to make a slight change in a stock tap to give better operating efficiency and step up the tapping cycle.

Let a Bath representative check your production tapping set-up. He'll help you get Better Threads with Bath Taps.

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE

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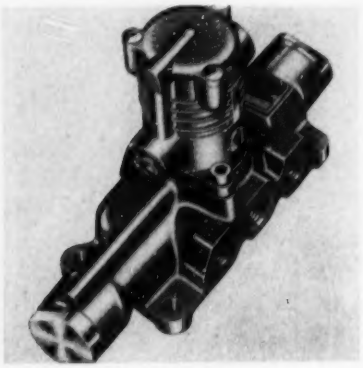
PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

22 Grafton St., Worcester, Mass.

Alfco Foamite and Soda-Acid 2½-gal. fire extinguishers are now labeled with pictorial operating instructions, illustrating in four steps proper procedure for use.

American-LaFrance-Foamite Corp, Elmira, NY



New Line of Solenoid Air Control Valves

Valvair announces a new line of solenoid pilot-operated air control valves. They are available for 3-way, 4-way, and 5-port application in pipe sizes ¼ through 1 in. All types and sizes are furnished either for foot-mounting or sub-base manifold mounting in accordance with JIC specifications.

All parts are non-corrosive. Main valve body, and also sub-base, is cast bronze. Spool is stainless steel, hard chrome plated and polished to assure long life to the special hycar O-ring seals. There is no spring in the main valve since air from the pilot valve is utilized to reverse the spool in both directions. Spool is main moving part of main valve body and all parts are easily accessible without disturbing piping to valve.

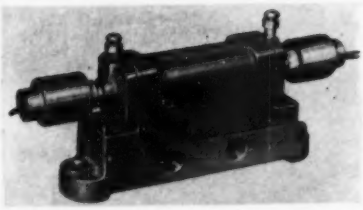
Pilot valve control unit is manifolded with capscrews to main valve body. Optional manual override is available for the pilot valve. This makes operation possible when electric current is off or when cylinder control setups are of importance.

Solenoid coil is replaceable and available in any ac voltage and cycle. Max power consumption is only 10 watts, assuring cool operation and long life at operating speeds as high as 600 cpm.

Exhaust port is common for both pilot and main valve, being the next pipe size larger than the inlet and cylinder ports to assure fast cylinder exhaust.

All models are for air pressure from 35 to 150 psi and for low-pressure oil hydraulic service.

Valvair Corp, Akron 11, Ohio



Four-Way Slide Valve Worked By Cam, Hand, or Solenoid

Pilot-operated four-way slide valve is addition to Nopak line of air control valves. This model V valve can be pilot operated by cam, hand or foot control poppets, or by solenoid pilots.

Master valve unit type R embodies a slide valve linked to balanced piston with line pressure maintained on the inside, as well as on both ends. Exhausting air from either end of the piston by means of two-way bleeder valves causes pressure on opposite end to shift the valve. Valve position is maintained until the air from the opposite end is bled.

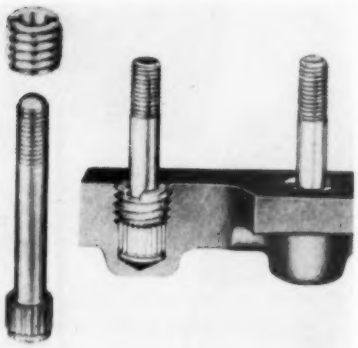
Type AR master valve unit has a slide valve linked to an unbalanced piston. Inside of piston is under constant pressure. Piston is shifted by admitting pressure to large end through energization of a three-way, normally closed solenoid pilot valve.

All air passages in both types are precision drilled; there are no cored air passages. Type R is available in ¼-, ⅜-, ½-, and 1-in. pipe sizes; AR in ¼, ⅜, and ½ in.

Galland-Henning Mfg Co, Nopak Div, Milwaukee 46, Wis

Thermo-Cote D is a protective strippable coating developed to prevent corrosion or abrasion damage to metal tools and parts during storage, handling, or shipment.

Plastics Div, Ernst Bischoff Co, Ivoryton, Conn

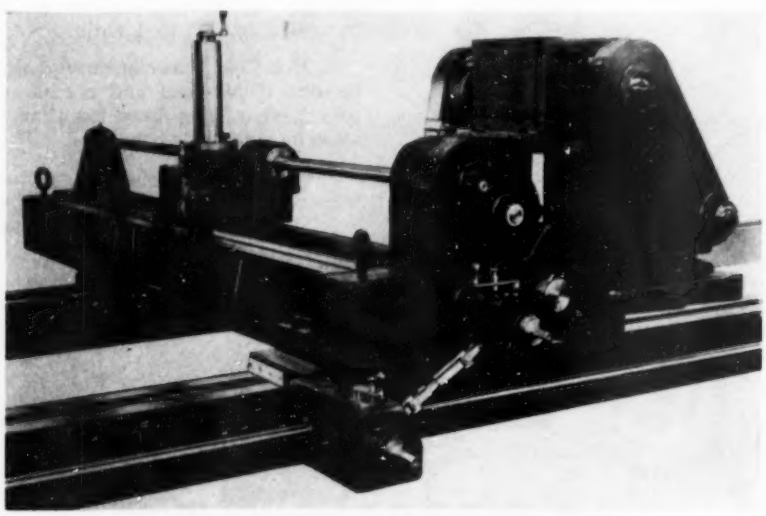


Threaded Stud Has Knurled Head

Threaded stud, for installation in metal or plastic, is provided with a knurled head and fitted with a pressure ring. In addition, it has a positive lock against rotation and pull-out. The knurled head broaches its way into the base material and securely holds the stud against rotation. Pressure ring, screwed in place, locks stud against being pulled out.

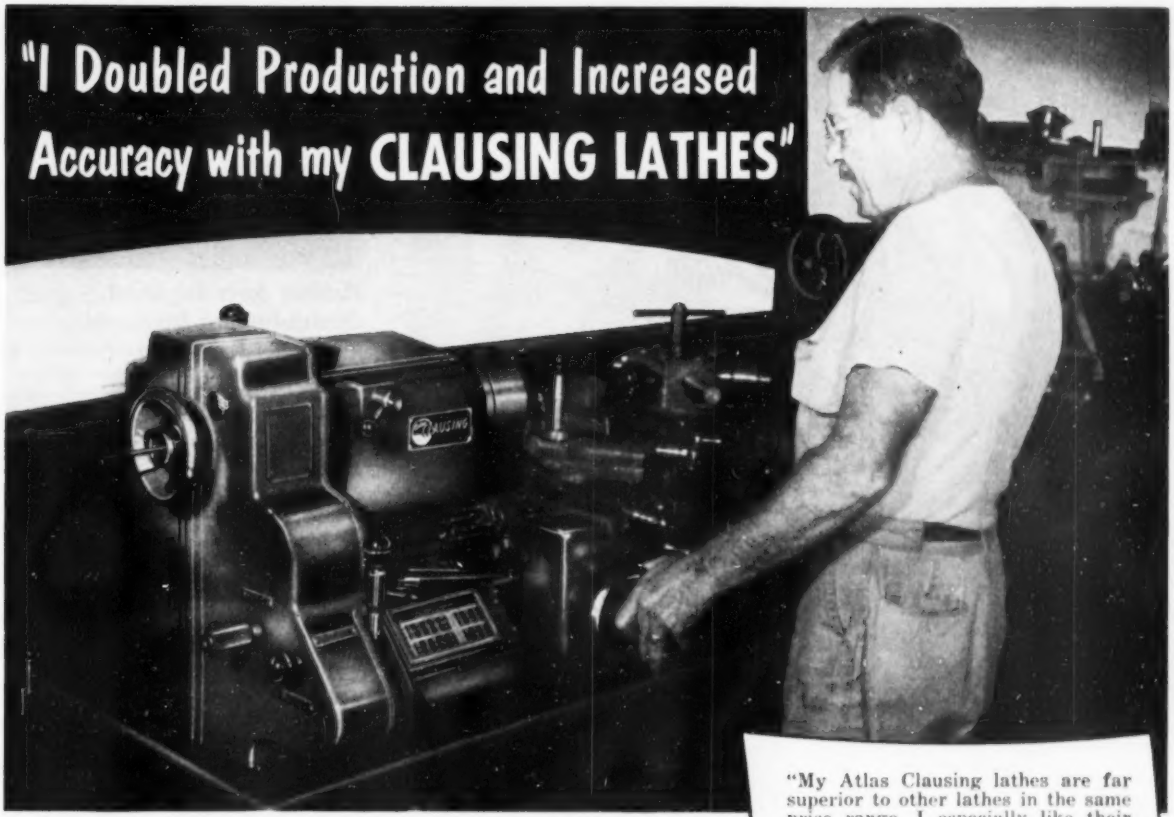
Studs are available in cadmium plated alloy steels with ultimate tensile strengths to 165,000 psi, stainless steel, or special alloys.

Newton Insert Co, 1321 E 17th St, Los Angeles 21, Calif



PORTABLE UNIVERSAL MILLING AND FACING MACHINE for use on large work has spindle range from 9 to 72 rpm and uses cutters from 3 to 15 in. in dia. Surfaces up to 84 in. wide can be milled—*Forney's, Inc, Box 310, New Castle, Pa*

"I Doubled Production and Increased Accuracy with my CLAUSING LATHES"



"My Atlas Clausing lathes are far superior to other lathes in the same price range. I especially like their power and accuracy! I turn extension shafts for communication sets .001 under 3/16 inch for a length of 1-1/2 inches with a .00001 tolerance. The diameter must be .1865 for the full length. It's easy to maintain this accuracy with my Clausings and I can't do it with other lathes I have in the shop. I get better production with the Clausings due to their power and rugged construction. Where ordinarily I would cut 50/1000 to the cut, I double it with the Clausings. Actually, I doubled production and increased accuracy with my Clausing Lathes. They have been real money-makers and their upkeep cost has been zero."

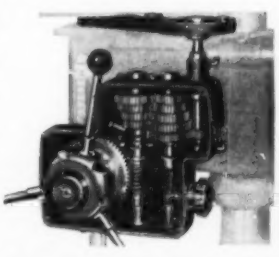
(signed) James H. Sawyer
Sawyer Metal Products
Miami, Florida

CLAUSING 6300
12" HEAVY DUTY PRECISION LATHE

The Clausing 6300 Series has every advanced feature that contributes to machining speed and efficiency. It has 1" collet capacity and 1-3/8" bore — forged steel spindle with tapered, key-lock nose — Timken tapered roller bearings — quick change gears — splash lubrication of headstock, apron, and quick change gears — heavy duty bed with 2 precision ground Vee-ways and 2 precision ground flat ways. 8 speeds, 50 to 1300 RPM. 12-3/4" swing over bed, 7-1/2" over saddle. 24"-36"-48" between centers. Before you buy any lathe it will be worth your while to check these and the many other outstanding features of this fine quality lathe at your Atlas-Clausing distributor's.

18" CLAUSING DRILL PRESS
with NEW POWER FEED

- Heavy-duty, gear-driven power feed. Drive is thru four sets of change gears, worm gear.
- Powered by V-belt from drill spindle.
- Instant dial feed selection — no belts to position.
- Steel change gears with ½" face. Hardened stress-proof steel worm. Bronze worm gear with ¾" face.
- Worm gear runs in bath of oil.
- Heavy-duty Oilite bearings, with ball thrust bearing on worm shaft.



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HOW HEAT

(UP TO 2200° F)

CAN BE STOPPED COLD

Destructive effects of extremely high temperature can be minimized—by using Kentanium at the critical points.

WHAT is Kentanium?

Chiefly titanium carbide (and small percentages of other refractory metal carbides), with nickel "binder". Uses neither tungsten nor cobalt. Hardness: Up to 93 RA. Weight: ⅔ that of steel.

WHAT can it do?

Resist thermal shock, withstand oxidation and abrasion, retain great strength at high temperatures (1800°F and above).

WHERE is it in use?

Successful applications include: Valves, valve seats, reduction crucibles, anvils for spot welding, hot extrusion die inserts, bushings, thermocouple protection tubes, flame tubes, furnace tong tips, balls for hot hardness testing, nozzle vanes and blades for jet engines, and many others.

WHAT forms are made?

Tubes, rods, bars, flats by extrusion process. More complex parts by machining from pressed slugs before sintering, extremely accurate parts by grinding to required tolerance after furnace sintering.

HOW can you use it?

This remarkable new metal, available in many "grades" to meet specific combinations of imposed conditions, can best be adapted to your high temperature problem by cooperative effort. Our engineers will be glad to discuss how you can get best results from Kentanium.

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KENTANIUM

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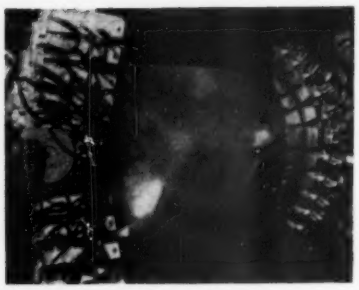
See Kentanium demonstration—National Metal Exposition—Cleveland—Space 311



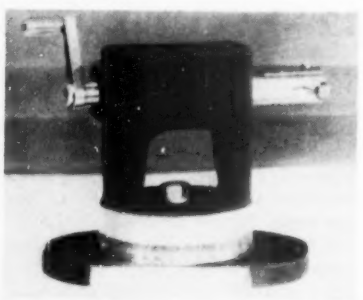
Flexible Jaws for Sheet Stretch-Forming Equipment

Function of flexible jaws is to grip and curve sheet to cross-sectional contour of die. While part is held in this profile, stretch-forming completes the longitudinal curves of the part.

Jaws are composed of numerous segments, each containing a set of hydraulically actuated grippers. Segments are hinged together by pivot pins. Degree of curvature is established by adjustable setscrews. Jaw curvature is energized by pair of hydraulic cylinders in each segment which are controlled from operator's pedestal.

Centroid shifter is provided to centralize load of curved shape to tension cylinder shaft. This is essentially a slide on which jaw is mounted so its position can be shifted laterally by hydraulic cylinder or screw.

Hufford Machine Works, Inc, El Segundo, Calif

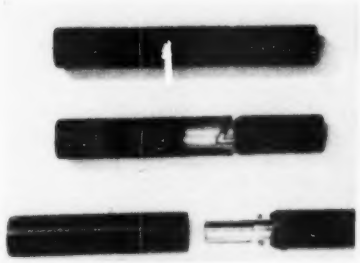


Angle Dresser

Phelco angle dresser has been designed to dress both sides of emery wheels, without disturbing original setup, through use of a double-end diamond. Fixture can be used on both cylindrical and surface grinders by means of a slight adjustment. Setup time is said to be reduced to a minimum, and tool can be used by inexperienced operators.

Dresser has a diamond travel of 2¼ in., with accuracy assured by a threaded shaft operated by a small hand-crank. Base is machine-engraved to 360° in graduations of one degree increments.

Phelan Engineering Service, 1913 W Magnolia Blvd, Burbank, Calif



Cable Connector

Dalweld detachable welding cable connector was designed to eliminate accidental disconnection. Connectors have expander-type male end which inserts in female with ¼-turn to make wipe-joint fit for complete electrical contact. Current-carrying parts are made from bar brass machined to close tolerance. Casing is heavy-duty insulating-fiber tube. Made in 400- and 600-amp capacities for both soldered and mechanical connections.

Dalweld Co, 1 Bertel Ave, Mt Vernon, NY

Rate-of-Rise Thermostat Prevents Overshoots

Rate-of-rise thermostat controls rate of heating and prevents hazardous temperature overshoots in fast-warm-up systems. Unit may be used either with standard temperature controls or as a separate safety control. After controlled warm-up period, standard temperature controller takes over and unit acts as safety check.

Device is adjustable to control any heating rate between 10 and 100 F per minute and can be used in any

MUELLER BRASS CO.

forgings

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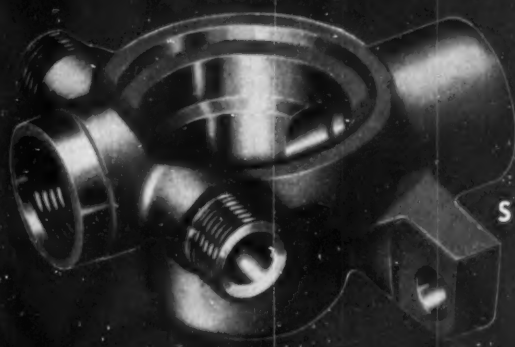
FORGED TO PERFECTION



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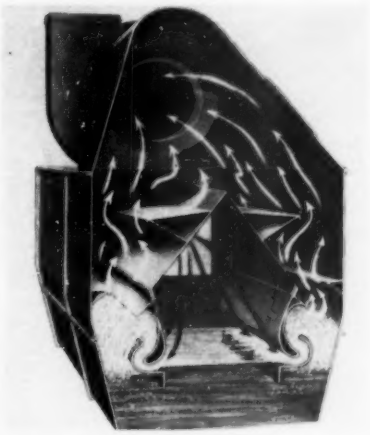
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

ambient temperature between –100 and +550 F.

Both outer shell, which houses contact assembly, and exterior electrical terminals are made of stainless steel. Triangular mounting flange makes unit easy to install. Cartridge extends 3¾ in. below the mounting flange, and overall length is 4¾ in. It is ⅝ in. in dia and weighs less than ¼ lb. Electrical rating is 5 amp at 115 v ac or 2 amp at 28 v dc.

Fenwal Inc, Ashland, Mass

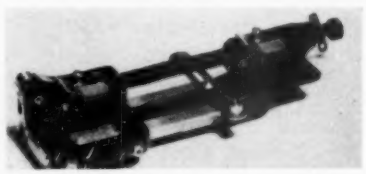


Roto-Clune Dust Collector Uses S-Shaped Water Curtain

Design 4, type N Roto-Clune dust collector is an improved hydrostatic preciptator that separates dust from air by means of an S-shaped water curtain. It is available in three models, identical in operating principle but differing in hopper design and means of sludge removal.

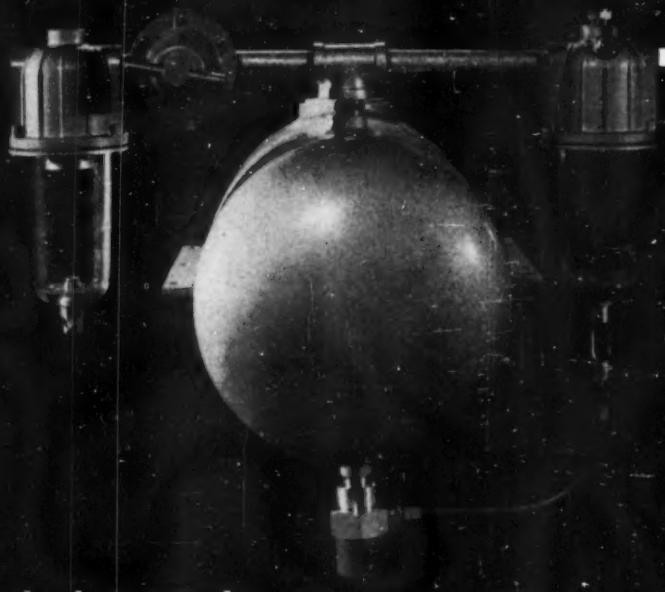
Improved features are reported as: non-plugging water entrainment separators; heavier sludge ejector mechanism; wider ranges of sizes and capacities; and sectional construction to permit field conversion from one model to another. Sizes available have capacities ranging from 1000 to 48,000 cfm.

American Air Filter Co, Inc, Louisville, Ky



HITCH FEED attains feed lengths to 2½ in. and feeds stock of 0.031 in. max thickness. May be mounted on die set or attached to bolster to feed from any direction. Two or more may be used to feed separate ribbons from different directions — *H E Dickerman Mfg Co, 321 Albany St, Springfield, Mass*

IT'S NEW... lo-jet acro*



the revolutionary new coolant system that . . .

keeps cutting tool and work at room temperatures!

lo-jet acro's *proven results in America's leading industries are making production history, from coast to coast!*

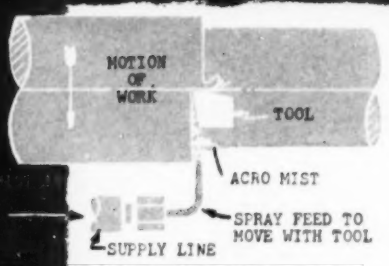
* Controlled compressed air operation for all types of metal cutting with special ACRO-COOLANT soluble solution.

Pictured here is the 8 1/8" outlet centrifugal equalizer distributor with 8 copper tube spray feed. This assembly serves 8 cutting operations.

lo-jet acro

- prolongs tool life
- cuts tool breakage loss
- saves money
- speeds production
- keeps work clean

there is a **lo-jet acro** *system for every purpose and every machine.*



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Our engineering staff will cooperate free of charge

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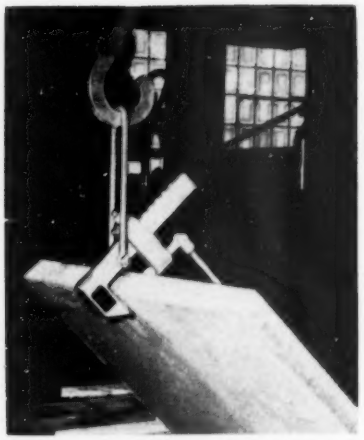
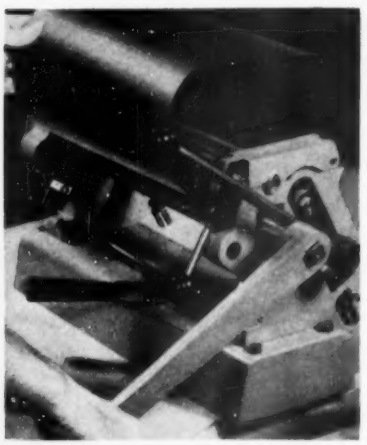


Gonser Portable Positioner

Designed for lifting plates, weldments, castings, and all heavy machinery and equipment, portable positioner combines wedge, screw, and toggle to form powerful gripping unit. Self-aligning, heat-treated grip cups have knife sharp edges to cut through rust, scale, oil, or paint. Long shackle allows for 360° turn. Unit will be available in two models, 0 to 2-in. jaw opening and 1 to 8 in. Capacity is 2 tons with 300% safety factor.

James Campbell Smith Co, Inc, Willoughby, Ohio



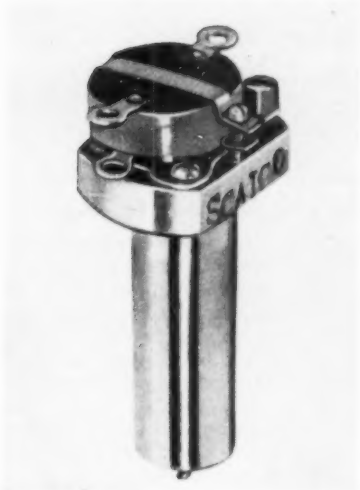
Hand-Operated Roller In Six New Models

O'Neil-Irwin Mfg Co announces the addition of six hand-operated rollers to its line. New models have a material capacity ranging from 16- to 24-gage sheet steel, forming width range of 12 to 42 in., and radius capacity from 2 in. to infinity.

Rollers incorporate a cam-idler feature making it possible to form circles of any diameter in two passes through the rolls.

Prices range from $110 to $355.

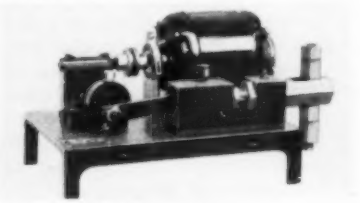
O'Neil-Irwin Mfg Co, 512 Eighth Ave, Lake City, Minn



Snap Action Temperature Switch

Scaico No. 3-C1200 Tempswitch was developed for close control where conditions require snap action of contacts. Assembly is small, 2¼x1 in., and weighs 1.2 oz. As temperature increases the thermo-sensitive liquid fill in the case pushes the plunger which actuates the snap-action switch. Switch is designed with terminals for connecting direct contacts, open-on-increase, or reverse contacts, close-on-increase; ranges 70 F to 150 F standard; others to 300 F.

Smith Control & Instrument Co, Inc, Market St, Palmyra, NJ



Controlled-Volume Pumps

Pumps deliver exact quantities of a wide range of products regardless of change in discharge pressure. Such hard-to-pump materials as abrasive slurries, suspended solids, and viscous and corrosive chemicals are said to be easily handled by these precision pumps.

Liquids can be delivered in quantities as low as 3 milliliters per hr to as high as 50 gpm against pressures to 20,000, psi. Plunger stroke can easily be adjusted when volume of delivery is to be changed.

Pumps are made of brass, nickel, 18-8 stainless steel, plastic, hastelloy, C and B monel, cast iron, and steel. Multiple as well as single units are available.

C C Pump Mfg Div, Market-Madison St, Palmyra, NJ

ARE YOUR PRODUCTION AND PROFITS GOING INTO THE SCRAP HEAP?

AVAILABLE IN FOUR TYPES

REGULAR —Type A
for normal supporting

INVERTED—Type B
Reverse of Type A support

TEE HEAD—Type C
used with sliding V-blocks

ADJUSTABLE—Type D
set your own holding pressures

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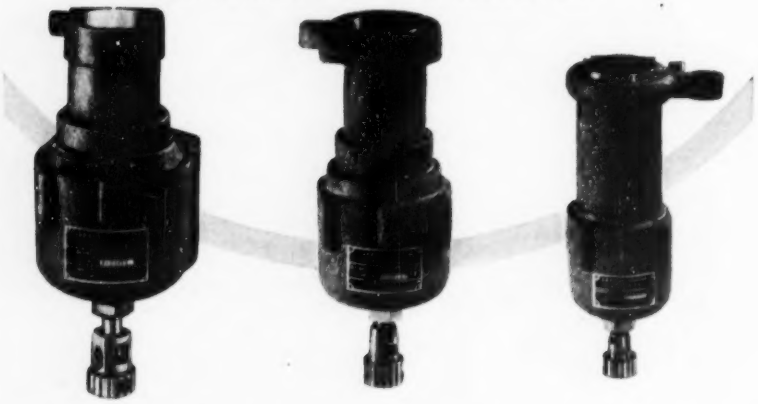
Distributors of Spring Plungers, Spring Stops, Fixture Keys, Toggle Pads.

It's 3 to 1 a Jarvis TORQOMATIC

can do your tapping jobs better

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS



A complete range of Jarvis Torqomatics — available to fit any type drill press or tapping machine.

You'll like their trouble-free performance — their ability to produce quality threads — their increase in tapped holes per hour, the savings in taps — and their ease of operation!

We invite your inquiries about these highly efficient Jarvis Torqomatics that have outmoded all other slow, expensive and highly perishable machines of the past. Jarvis Torqomatics are priced low enough to make it economically possible to replace your old tapping devices and attachments.

A Jarvis representative will be glad to consult with you — no obligation.

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SPECIFY YOUR NEW DRILL PRESS BE JARVIS TORQOMATIC EQUIPPED

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

Auto-Tap 1-in. Leadscrew For 5/16- to 5/8-in. Tapping

Larger leadscrew increases the range of leadscrews and Auto-tap leadscrew tapping attachments from 5/16 to ⅝ in. Unit is designed primarily for use with Auto-tap support arm. Leadscrews have 1-in. dia and are furnished with variety of pitches including 27 and 18 pitch for ⅛- and ¼-in. pipe taps. Jacobs Rubberflex collet furnished with leadscrew will take tap shanks up to ⅝ in.

Automatic Methods, Inc, 965 W Grand St, Div 16, Elizabeth, NJ

Rust-inhibiting oil additive, called Atpet 100, is said to offer more complete protection of ferrous surfaces than previously possible with other non-metallic inhibitors. In a standard humidity cabinet test, it has withstood 634 hours' exposure at 1% concentration in oil, or nearly double that obtainable with earlier inhibitors.

Industrial Chemicals Dept, Atlas Powder Co, Wilmington 99, Del

Adamas line of single point standard carbide tools is available in eleven styles with finished diamond ground cutting edges. Tools, with color-coded shank markings, come in grades for cutting steel, cast iron and non-ferrous materials. Silver solder brazed units have cold drawn steel shanks, and cutting edges plastic-dipped for added protection.

Adamas Carbide Corp, Harrison, NJ

Perma-Line plastic chart-gages are available with specially processed permanent lines on 0.050-in. thick Vinylite. Charts are dimensionally stable, tough and rigid for ease of handling and storage, exceptionally translucent, and easily cleaned.

Optical Gaging Products, 26 Forbes St, Rochester 11, NY

Pencil soldering iron has been designed with tip and element as separate parts, replaceable independently. Cool handle of the 2-oz iron is held like a pencil only three inches from the soldering joint. Available in 25 watts with ⅛-in. tip (Cat. No. 25S), or 30 watts with 3/16-in. tip (Cat. No. 26S). Either iron operates on ac or dc, any cycle; available in 110 or 220 volts; price, $5.

Hexacon Electric Co, 135 W Clay Ave, Roselle Park, NJ

HAND TAPS

NUT TAPS

PULLEY TAPS

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

have "Custom Made" Cutting Edges at NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

Send for complete Tap Catalog now—also name of your nearest Jarvis representative.

JARVIS POWER TOOLS

include:

TAPPING ATTACHMENTS • TAPS
ROTARY FILES
FLEXIBLE SHAFTS and MACHINES • TUNGSTEN CARBIDE REAMERS and MILLS • DRILLS
BORING BITS

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

ROTATING
AIR CYLINDERS
SPEED
PRODUCTION
ELIMINATE DOWNTIME
Piston packings "replace" themselves by expansion from air pressure... practically eliminates repacking downtime. Aluminum or alloy iron housing. Non-adjustable, chevron-type rod packing. Long stroke. Balanced for high r.p.m.
Installed as original equipment by Bardons & Oliver, Cleveland Automatic, Cone Automatic, Monarch, National Acme, Warner & Swasey... and others.
Representatives in principal cities. Prompt deliveries. Send for S-P Catalog 101, containing full engineering data.
S-P
POWER CHUCKS
Unique cam and lever design gives tighter grip, highest safety factor. Prompt deliveries. Send for Catalog 101.
OTHER S-P PRODUCTS: Parallel Grip Collet Chucks, Drill Press Chucks, Expanding Arbors, Blank Jaws, Hydraulic Cylinders, Air Cylinders, Air Valves, Air Pistons, Air Control Accessories.
THE S-P MFG. CORP.
ESTABLISHED 1918
12415 EUCLID AVENUE
CLEVELAND 6, OHIO
A Bassett Company

Ortho-Weld magnifying lenses, designed to aid welders wearing bifocal glasses, are made to fit all standard welding helmets. Insertion of the lucite lens between regular helmet filter lens and rear cover plate of the lens holder provides close-up vision at any angle. Lens which may be used by all welders as a magnifier on jobs where precision work is required, is available in four strengths or powers, with a range to fit needs of most bifocal wearers.

Bausch & Lomb Optical Co, 635 St Paul St, Rochester, NY

Zur-Kap grease-fitting cover made of oil-resistant neoprene, is designed for use on all pieces of equipment using either Zerk- or Alemite-type fittings. Device eliminates danger from excessive wear from dirt particles normally forced into the unprotected fittings with each application of new grease. Easily snapped on and off, Zur-Kaps save time usually required to clean fittings before each lubrication.

Winner Mfg Co, Box 945, Fort Wayne 1, Ind

EutecTrode 69AC and 690-DC are particularly recommended for joining of light sections of low and medium alloy steel and stainless steel types 301, 302, 320B, and 303. Product is said to offer greater alloy deposition per electrode, produce smooth running deposits of excellent appearance, and permits swift, easy slag removal. Availabe in 3/32, 5/32 and 3/16 in.

Eutectic Welding Alloys Corp, 172nd St and Northern Blvd, Flushing, NY

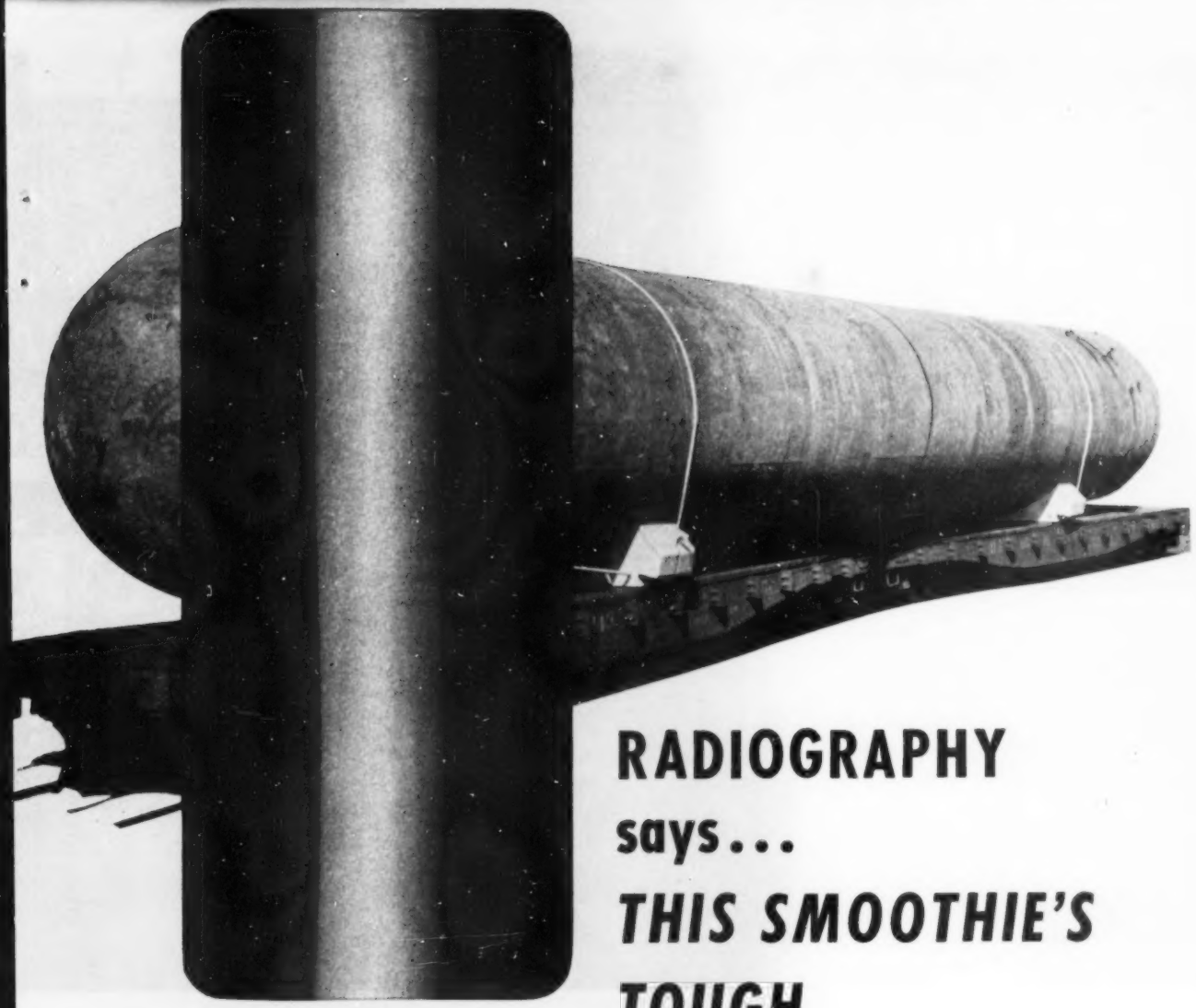
Drill for use with hardened steel up to 68 R without annealing has been designed with three wide lands to keep it from floating. Oversize holes are reportedly eliminated due to greater bearing surface of the lands; heavy center section overcomes drill breakage. Units, which operate on any standard drillpress, can be used for countersinking, or reaming in hardened steel, finishing the holes right to size.

Tempered Steel Drill Co, 3610 Superior Ave, Cleveland 14, Ohio

Scotty line of steel industrial work benches is available in 48-, 60-, and 72-in. lengths, and 29-, 30-, 34-, and 36-in. widths. Choice of bench tops includes heavy steel, 1¾-in. laminated hardwood top, or 1¼-in. Nat-Flex top. Height, 34 in. Nat-Flex plastic base-composition top is a nonconductor, resistant to oil, grease, water, and abrasion.

Shure Mfg Corp, 1601 S Hanley Rd, St Louis 17, Mo

THREADED SPECIALTIES
EYE
BOLTS
by an
exclusive method
Among Pawtucket's many specialty products, these lower-cost eye bolts or "swing" bolts are the leaders in this field. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.
Pawtucket eye bolts are made in standard sizes ¼" and larger, or to your specifications. In any size, you can depend on a uniform Class 3 fit.
BETTER BOLTS SINCE 1882
PAWTUCKET
"THE BOLT MAN"
MANUFACTURING COMPANY
327 Pine Street Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS



RADIOGRAPHY says... *THIS SMOOTHIE'S TOUGH*

This 90-ft. pressure vessel looks smooth, clean, and neat. But that's not all that welding did for it. It helped make the tank strong and tough with less weight and at lower cost.

Designers of pressure vessels can take full advantage of the welding process because each weld can be proved sound by radiography.

This is how radiography widens the opportunities for welders—why it can increase your business.

Wouldn't you like to know more about how it can help you? Get in touch with your x-ray dealer and talk it over.

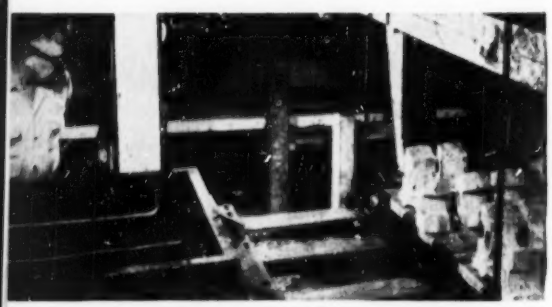
EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, New York

Radiography . . .
another important function of photography

Kodak
TRADE-MARK

Picture shows how oil that forms sludge can clog cooler. Sun Quenching Oil's natural detergency helps prevent such sludge formation.

Oil Coolers Don't Clog with

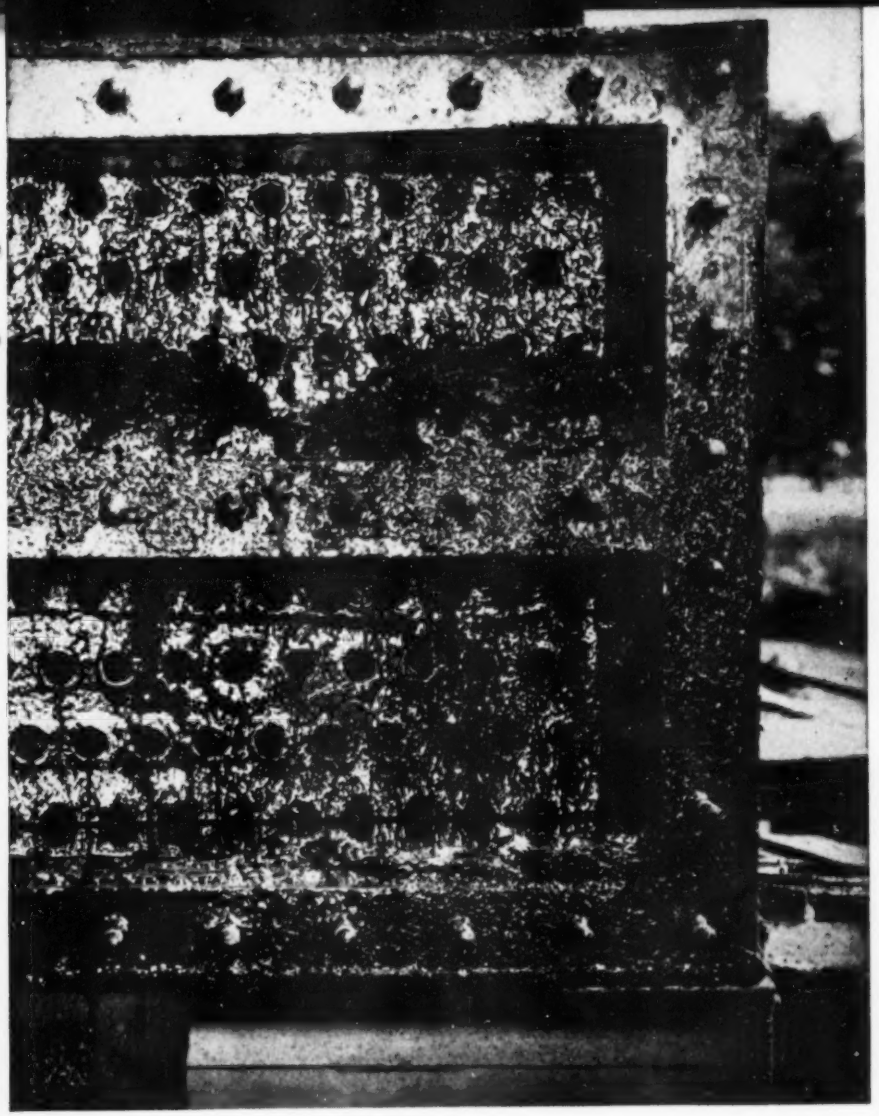


A New England firm uses five 2400-3000 gallon systems to quench all types and sizes of aircraft and automotive forgings. Since Sun oil was adopted 7 years ago, not one system has required cleaning except for normal removal of mill scale.

Sun Quenching Oils keep oil coolers clean. Teardowns are fewer and maintenance costs less. This is because Sun oils have a natural detergent action that prevents the formation of sludge and aids in removing any deposits that exist.

Can Handle 95% of All Quenching Jobs

Tests show that Sun Quenching Oils give better all-around results. For one thing, they assure hardnesses far above the commonly accepted minimum requirements. In any system that provides normal agitation, they can handle 95 per cent of all quenching jobs.



Line of Bryant granite surface plates has been introduced for use as reference plates in layout, inspection, and assembly work. Granite is said to be of exceptionally close-knit composition, with surface precision guaranteed.

Bryant Chucking Grinder Co, Springfield, Vt

No. 994 GRIPTEX, a strong, heat-resistant cement, has been developed for adhering sandpaper to metal or wood sanding disks. Disks need not be removed individually, but can be cemented one on top of the other until six or eight have accumulated. Cement reportedly does not tend to become sticky when heat is generated in operation.

Adhesive Products Corp, 1660 Boone Ave, New York 60, NY

Work-holding pot magnets are available in two types: round model MCR with a 4-in.-dia, and a pull of 275 lb with air gap 0.005 in.; cube model MCQ, 3¾ in. on each side, pull of 375 lb with same air gap. Both have tapped holes for securing to fixtures or structures. Priced at $70 per pair MCR, $75 per pair MCQ.

Aronson Machine Co, Arcade, NY

Adhesive, called ADWELD, produces a bond with 3000 lb per sq in. strength to join similar or dissimilar materials or metals. Designed for applications where fire hazard prevents welding, the product can be made to set in ten minutes, using only clamps.

Miracle Adhesives Corp, 21½ E 59rd St, New York 22, NY

Dispenser is available to fit jars of Fend barrier creams, used as protection against industrial dermatitis. Depressing plunger in the cap dispenses a small amount of the cream; unit can be used on entire line except Fend I. Price, 50¢.

Mine Safety Appliances Co, Braddock, Thomas and Meade Sts, Pittsburgh 8, Pa

Saxton 6-in. clamp with a 5½-in. throat depth applies straight line force at point of clamping, thereby eliminates stress and strain hazards usually found in most methods of deep throat clamping. Torque-converting, spring-bearing trunnion eliminates distorting, twisting action. Horizontal position of the screw at all openings provides complete access to the work area. The 4-lb unit is also available with regular throat sizes of 3, 6, 9, and 12 in.

Centinela Industrial Supply Co, 11930 Inglewood Ave, Hawthorne, Calif

Sun Quenching Oil

Sun Quenching Oils Reduce Operating Costs
Sun oils thin out when heated, drain off parts faster and more completely. Dragout is reduced to a minimum. They do not thicken up, and under normal operating conditions need never be replaced. For more information about Sun Quenching Oils, call your nearest Sun office or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-10.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
SUNOCO

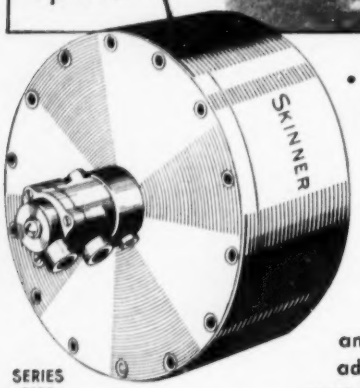
PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

SKINNER

accessories

power chucks

air cylinders



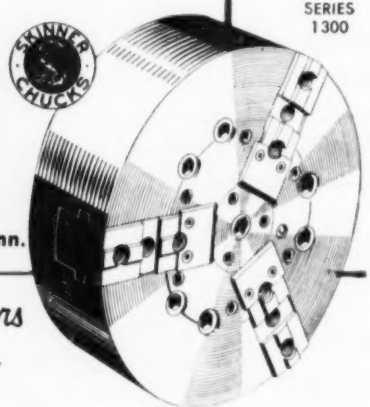
SERIES 2100

...for every high production need!

The Skinner line of power chucking equipment has the strength, rigidity and design features so essential for today's production needs. Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates the draw bar. Skinner double-acting rotating (series 2100 for speeds up to 1500 R. P. M.) and non-rotating air cylinders are available with semi-steel bodies for all sizes of Skinner power chucks, and for actuating all types of holding fixtures and tailstocks. Series 2200 double-acting rotating air cylinders have aluminum bodies for efficient operation up to 3000 spindle R. P. M. Skinner accessories include hand-operating valves — complete air unit, including regulating valve, pressure gage and lubricator — filters — soft blank top jaws; draw bars — draw tubes, etc.

Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses" — available for free showings.

SERIES 1300



THE SKINNER CHUCK COMPANY

203 Edgewood Ave., New Britain, Conn.

Sold by leading distributors in every industrial area

Series of 24 light-weight, air-operated, reversible screwdrivers and nut setters has been added to the Thor No. 2 line of air tools. Units feature reversible motors to permit the tool's use for removing threaded fasteners as well as applying them, and for speeding inspection, testing, service, and repair of all assembled products. Reversibles, weighing only 2 lb, are available in 4 basic speeds, ranging from 475 to 2000 rpm. Each is offered with either slip clutch (for exacting tension control) or positive clutch (manual control).

Thor Power Tool Co, Aurora, Ill

Seecloth is a chemically treated cloth for simultaneously cleaning and mistproofing goggles, glasses, masks, windows, and mirrors. Effectiveness lasts from a period of a few hours to two weeks, depending on atmospheric conditions; cloth can be reused and remains effective for several months' use. Packaged in 8x9-in. piece for goggles, and larger pieces for other uses.

Hygiene Research Inc, 68½ Broadway, New York, NY

Wedge-Head wrench fits into tight corners, against walls and over obstructions where sockets, box wrenches, and other ordinary open ends cannot reach. Wedge-shaped jaws and narrower head permit perfect grip on nuts. Because head is angled, tool takes solid bites on thin square or hex-shaped nuts and permits wrench to clear obstructions without skinning knuckles. Hollow dome inside head gives full jaw grip at all angles. Available in sizes 7/16 in.-1/2 in.; 9/16 in.-5/8 in.; and 3/4 in.-⅞ in.

Blackhawk Mfg Co, Milwaukee 46, Wis

Swagelok insert, used in conjunction with flexible Tygon plastic tubing and leakproof Swagelok fittings, protect fittings against cold flow in the plastic, and support ID of tubing; torque-free fitting grips and seals OD. Inserts available in any metal in sizes from 3/16 in. OD and up.

Crawford Fitting Co, 884 E 140th St, Cleveland 10, Ohio

Fire-retardant paint called Fyr-Kote, is said to stop fire from spreading. Applied by brush or spray, the washable flat wall paint is particularly adapted for general maintenance application on all surfaces. Oil-base product has been listed by Underwriters' Laboratories.

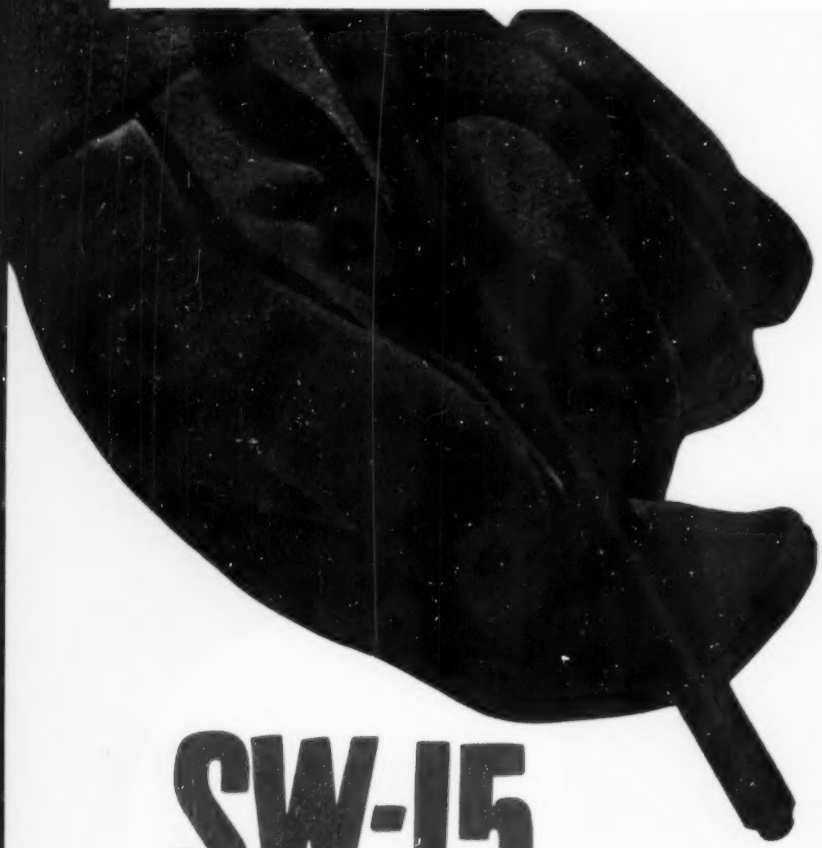
Fyr-Kote Co, Div, Morris Paint & Varnish Co, 27th and Douglas, Omaha, Neb

more manufacturers are using SW-15 electrodes than ever before!

FASTEST GROWING ELECTRODE

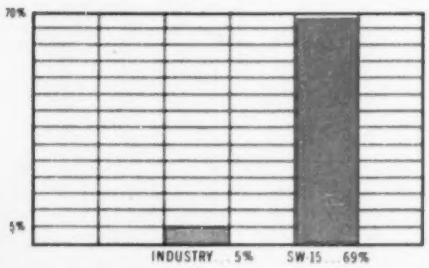
The chart shows the increase, from 1950 through 1952, in shipments of electrodes. And the A. O. Smith SW-15 leads the industry's increase by 13.2 times!

more manufacturers are using SW-15 electrodes than ever before!



SW-15

the UNIVERSAL Electrode



Here is the evidence of SW-15's growing acceptance among manufacturers who depend on welding in the fabrication of their products. SW-15 showed a 69% increase in acceptance and use, as compared with but 5% for all electrodes produced by the welding electrode industry from 1950 through 1952.

A few of the principal users of SW-15 are:

J. D. Adams
Allis-Chalmers
E. W. Bliss
Caterpillar
Chicago Bridge & Iron
Fruehauf Trailer
Graver Tank & Mfg. Co.
The Heil Company
Illinois Central Railroad
Ingersoll Rand
Iowa Iron & Steel
Kansas City Structural Steel
Link Belt Speeder
Omaha Steel
Pullman Standard Car
Santa Fe Railroad
Sheffield Steel
Tracksen Company

Others are joining these every month to share the many benefits which the SW-15 electrode provides their welding operations.

SW-15 was developed as a universal type electrode which could be used for an extremely large number of welding applications. There is nothing else like it among mild steel welding electrodes!

It performed its first welding job in 1939, when it was taken into the field to weld refractory towers and sustaining structures usually welded with an E6010 electrode. It bettered the standard welding time by 50%! Its unusual ease of manipulation won over welding operators and management at once. New operators were readily trained with the SW-15. Its x-ray quality set new inspection records.

Two years later, SW-15 was welding on E6012 applications in the farm machinery and heavy road equipment fields. Excellent weld appearance, easy slag removal, little spatter, good bead with no undercut helped improve the products of these manufacturers.

Manufacturers found that due to SW-15's ease of manipulation, operators avoided slag inclusions, fish-eyes and voids, even in welds made in the field. This greatly improved the appearance of products it was used on and enhanced the reputation of the SW-15 electrode.

SW-15 is just one of the welding electrodes in the A. O. Smith line. There's an A. O. Smith electrode for every welding requirement:

MILD STEEL		HIGH TENSILE		LOW HYDROGEN		STAINLESS		STAINLESS	
AWS Class	A. O. Smith	AWS Class	A. O. Smith	AWS Class	A. O. Smith	AISI Class	A. O. Smith	AISI Class	A. O. Smith
E6010	SW-10	E7010	SW-75	E6016	SW-64	502	SW-151	310	SW-359
E6011	SW-14	E7010	SW-80	E6016	SW-65	505	SW-152	310	SW-169
E6012	SW-11	E7020	SW-76	E7016	SW-84	410	SW-153	310	SW-168
E6012	SW-17	E8013	SW-86	E8016	SW-81	430	SW-154	310	SW-368
E6013	SW-15	E9010	SW-95	E9016	SW-90	308	SW-162	316	SW-160
E6013	SW-16	E9013	SW-87	E9016	SW-89	308	SW-362	317	SW-161
E6020	SW-35	E10013	SW-88	E10016	SW-100	309	SW-166	318	SW-158
		E10020	SW-101	E12015	SW-120	309	SW-167	347	SW-157
				E12016	SW-103	310	SW-159	347	SW-357

THE ONE MILD STEEL ELECTRODE

no other can match!

...in ease of handling

SW-15 is easy for operators of varying skills to use in all positions. Its smoother arc, self-cleaning slag, lack of spatter and freedom from undercutting makes it easy for anyone to produce good looking, sound welds with the least effort!

...in quality of weldments

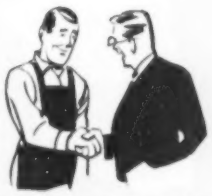
SW-15 welds have high-strength, high-yield, good ductility and consistent x-ray quality. This extends its use to welding low alloy, high tensile steels such as corten and manten, impossible for electrodes whose physicals can't compete with those found consistently in SW-15 welds.

...in appearance of welds

SW-15 bead appearance is excellent. Operators become more quality conscious, inclined to turn out better welding jobs when they can put in good looking welds so easily. Fine appearing welds aid in the ultimate sale of welded products, build acceptance not otherwise obtainable!

...in usefulness

SW-15 has an unparalleled history of success in many fields. Shipyards, during the war, cut their welding time as much as 50% by actual test and used millions of pounds of SW-15. Farm and construction equipment builders found its ease of application and high resistance to impact desirable, and became large users. Field erectors of vessels and structures adopted SW-15 after testing its speed, ease of application, and x-ray quality in weldments. Every year, more manufacturers turn to the SW-15 electrode to spur production and improve the quality of their welded products.



...in cutting costs

SW-15 is in a class by itself. Elimination of time-consuming slag removal, absence of spatter to be cleaned up, ease and speed of application by any operator, freedom from undercutting, excellent weld appearance that reduces inspection costs, and avoidance of weld repairs, all lower production costs directly. Then, the freedom from worry over possible field failures tops off these reasons for the tremendous use of SW-15 electrodes.

...in your plant

SW-15 has a use in your plant or shop. May we suggest that you write us or contact your local A. O. Smith Distributor for full details and a chance to test this remarkable mild steel electrode.

SMITH way

A.O.Smith

CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

A.O. Smith is your best single source for

A.C. AND D.C. WELDING MACHINES

with rated outputs from 180 to 1400 amps.

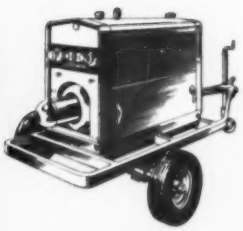
A.C. "CHAMPION"

A.C. "CHALLENGER"

A.C. "AUTOMATIC"

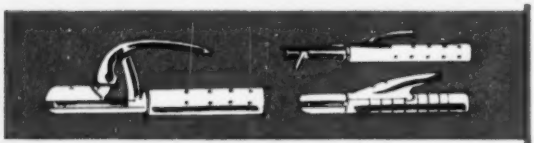
A.C. "UTILITY"

D.C. "RECTIFIER"



D.C. "FIELD KING"

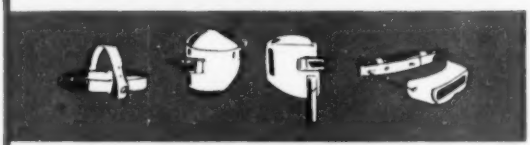
WELDING SUPPLIES



Electrode holders

Ground clamps

Cable, connectors, lugs, and splicers



Helmets, shields, headgear, and goggles

Cleaning tools, Electrode drying ovens

Protective clothing and gloves

Simplify your welding buying with

ONE PURCHASE ORDER

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION
MILWAUKEE 1, WISCONSIN

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

Circoloy line of circular metal cutting saws has been designed to fill performance gap between carbide and high-speed steels. Tools, said to be ideally suited for tougher work, can be used as well for regular cutting jobs, because alloy is said to outlast high-speed steel by a considerable margin. It requires no special handling and can be re-ground at will on any standard grinding apparatus. Available in thickness of 1/16 to¼ in.

Circular Tool Co, 765 Allens Ave, Providence, RI

Line of needle valves has been introduced for general application in controlling the flow of liquids or gases. The 270 Series are made of brass or 430F stainless steel bar stock in sizes from ⅛ to ½ in. NPT. Both straight line and angle pattern are available, with choice of O-ring seal or conventional packing. Self-aligning spindle insures tight seating; design permit repacking under pressure. Available for direct instrument panel mounting, with black plastic handwheel.

Hoke, Inc, 199 So Dean St, Englewood, NJ

Eutector Flux-I, a free-flowing root protective, is a specially designed gas flux for stainless steels to prevent oxidation which tends to form during welding and post heating. When applied to underside of butt and corner joints, penetration is simplified by flux action in controlling the molten weld metal, assuring overall underbead protection. Available in containers of 5, 25, and 50 lb.

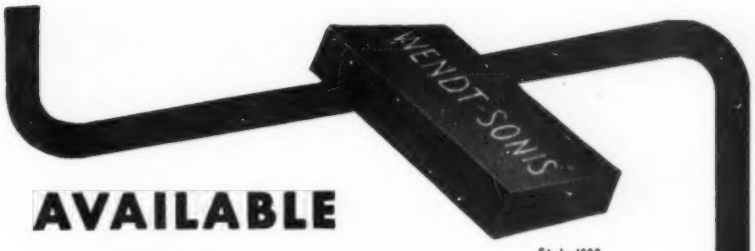
Eutectic Welding Alloys Corp, Northern Blvd and 172nd St, Flushing, NY

Insert power bit for production screwdriving is available in two grades—"tough" for aircraft industries, and "hard" for use with self-tapping screws common to the automotive industry. Both grades are manufactured in all size ranges, and may be used with existing adapters, either retainer ring or magnetic type. Available in four basic shank sizes in both hexagon and square inserts for use with Phillips and Frearson or Reed and Prince-type fasteners.

Zephyr Mfg Co, Inglewood, Calif

Blue streak release coating, called ABhesive, applied to Brady dispenser card, permits instantaneous, effortless removal of self-sticking markers from cards without distortion. Complete line of markers with new coating is available.

W H Brady Co, 727 W Glendale Ave, Milwaukee 12, Wis



Style 1000

AVAILABLE NOW!

The new line of WENDT-SONIS *Carbide* BLANKS

Style 2000 Style 3000 Style 4000 Style 5000

Reamer Blanks Solid Round Solid Triangular Center Tips

NEW! Write for the new "Tooling Tips" folder, Form 553, that contains complete details and prices for the new carbide blanks. Send a postcard to Dept. S.

Your local distributor now has a complete line of new Wendt-Sonis carbide blanks and inserts, in addition to his line of W-S carbide cutting tools.

Blanks are available in a wide range of styles including reamer blanks, solid rounds, and center tips. Inserts are made in triangular, square, round and diamond shapes. Both blanks and inserts are made in a variety of grades and sizes.

Wendt-Sonis carbide blanks and inserts are made to the same exacting standards as other Wendt-Sonis tools. Hundreds of production runs have proved that Wendt-Sonis blanks and inserts increase production and lower tool costs.

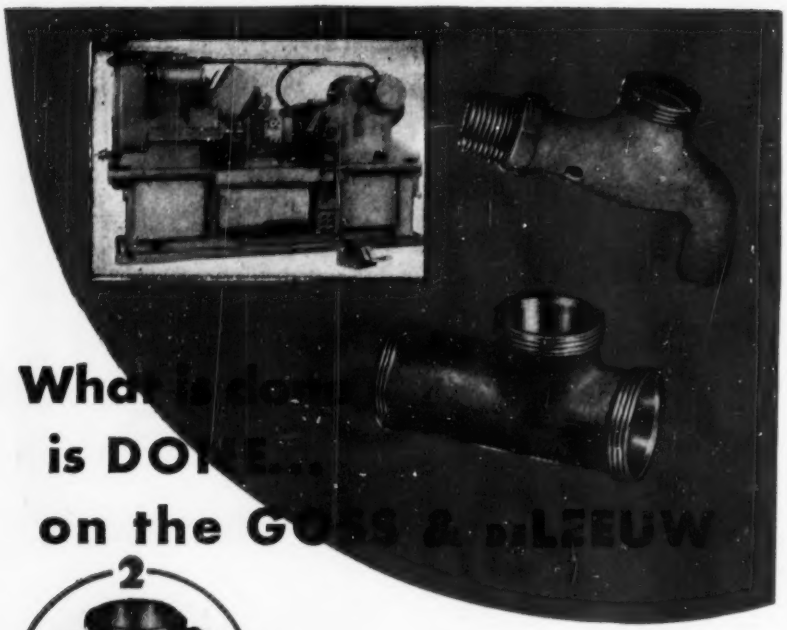
WENDT SONIS

HANNIBAL, MISSOURI

576 N. Prairie Ave. Hawthorne, California

549 W. Randolph Chicago, Illinois

A COMPLETE LINE OF CARBIDE CUTTING TOOLS AND BLANKS



What is done... is DONE... on the GOSS & DeLEEUW

AUTOMATIC CHUCKING MACHINE

There are no half-finished pieces lying around at the end of the day when you put your work on this outstanding machine.

The "1-2-3" feature—available only on the Goss & De Leeuw Automatic Chucker —provides the means of finish machining three ends of a part without changing set-up.

Note some of the typical parts machined. Ask for illustrated literature giving further details and send samples of your work for a cost estimate on handling it on the Goss & De Leeuw.

GOSS & DeLEEUW QUALITY PRODUCT-QUANTITY

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

Hexagonal nut socket has been designed to permit the nut running tool to positively engage nut while turning. Designed for use on air or electric power drive tools, socket is particularly suited for multiple nut running in mass production application. Surface drive unit can be applied at a slight angle so nuts can be run close to obstructions. Socket is available in drive sizes of ½ and ⅝ in. The ½-in. square drive is furnished in regular and deep lengths to fit ½ to 1-1/16-in. hexagonal nuts. The ⅝-in. size fits hexagonal nuts of 1/16 to 1¼ in. in the regular length, and ¾ to 1⅛ in. in deep length. All sockets available in size ranges in increments of 1/16 in.

Cornwell Quality Tools Co, 1004 Cleveland Ave, Mogadore, Ohio

Heat-resistant flooring has been developed to withstand thermal shock and deterioration under extremely high temperatures. Designed for use where temperatures range up to 2000 F, flooring disperses heat rapidly through aluminum rods embedded about 1 in. below surface. Because of their high thermal conductivity, rods carry heat from contact area and spread it over a wide section of the floor. Floor is ready for use 24 hours after installation.

Flash-Stone Co, Philadelphia, Pa

Circular chart electronic potentiometers for pneumatic control are available with narrow proportional band plus automatic reset action. Multiplying linkage provides proportional band settings from 1% to approximately 14% for full rotation of the graduated proportional band dial. Control variation is said to be particularly useful on processes with large capacitance or with small time lag. Linkage available as standard optional equipment for company's circular chart electronic Air-O-Line controllers.

Minneapolis-Honeywell Regulator Co, Industrial Div, Wayne & Windrim Aves, Philadelphia 44, Pa

Variety of replaceable vise jaws are available on all Wilton vises. Included as standard are hardened speed-treat steel jaws with diamond serrations. These may be replaced with smooth jaws of hard or soft steel. Smooth jaws of brass or copper, which are non-magnetic and non-sparking, are also available, as are plastic fiber jaws designed for very delicate work surfaces. All jaws are easily removable, and interchangeable, designed so as to be reversible, said to double jaw life.

Wilton Tool Mfg Co, 925-941 Wrightwood Ave, Chicago 14, Ill

GEARS

any size, any quantity

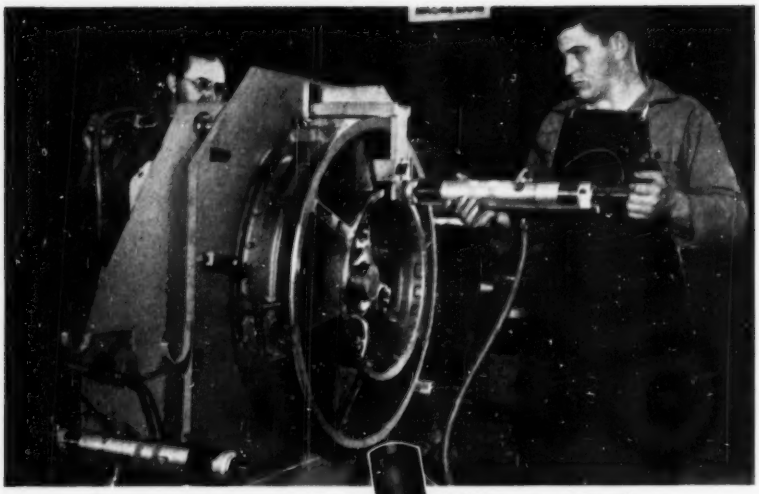
Spur	Splines
Helical	Coniflex Bevel
Spur Internal	Spiral Bevel
Helical Internal	Zerol
Rack	Hypoid
Herringbone	Intermittent
Worm	Sprockets
Non-Metallic	

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls



ANOTHER EXAMPLE OF *KELLER Air Tools engineered to industry*

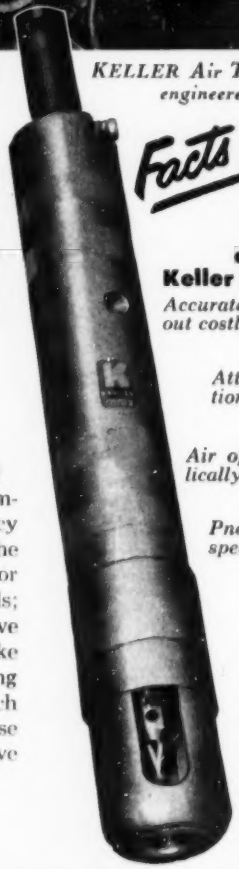
USE KELLER *Airfeedrills* for accurate automatic drilling

Keller Airfeedrills are recommended where extreme accuracy is needed, especially where the job cannot justify the space or cost of expensive machine tools; as in the case shown above where Keller Airfeedrills make the locating holes for machining jet engine parts . . . work which must be done to extremely close tolerances. Note the inexpensive fixture required.

Used on close centers and in tight places

Easily shifted from job to job

Drills metal, wood, composition, plastics



Facts in Brief about Keller Airfeedrills

Accurate holes without costly fixtures

Attaches in any position, at any angle

Air operated—hydraulically controlled

Pneumatic cycling to speed production

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet titled, "The HOLE Story of the Keller Airfeedrill."

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

Send for **FREE** 24 Page Booklet for more information about automatic drilling with Keller Airfeedrills

Steam-cleaning nozzle, called Steam-Blaster, flat in shape, has a center blade which creates a pressure differential between the two flat planes of steam, producing a knife-like cutting action at point where planes converge. Flow is said to be completely non-divergent for maximum impact and minimum waste of pressure. The 24-oz unit, usable with a straight or 45° union, has a 1½ x 0.04-in. orifice, and ½-in. pipe thread.

American Nozzle Corp, 30 Church St, New York, NY

COCOB No. 40 is made from corn cobs, ground, cleaned and milled into various sizes. Range of uses includes burnishing, drying, de-greasing, deburring. Product reportedly can be used three to four times longer than sawdust as a polisher and absorbent agent in drying metal stampings, ball bearings, etc, after which it can be used on shop floors to absorb greases, oils, and water.

Agri-Indus Manufacturing Co, 1327 Huntington Bank Bldg, Columbus 15, Ohio

Series 100 bushing and bearing extractor, designed for extremely small size holes, consists of ten threaded expanding arbors, a draw-table, and can handle extraction from any hole from ¼ in. to 25/32-in. ID. Unit is available with choice of single, 2, 4, or 10 expanding arbors to a set. Arbor sizes are 1/4, 9/32, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16, and 3/4 in. Starter sets, including steel carrying box, draw-table, draw-nut, antifriction washer, and choice of any two of the expanding arbors are priced at $19.95.

Crozier Machine Tool Co, 684 North Prairie Ave, Hawthorne, Calif

Red CaPlugs to protect threading, tubing ends, and fittings of all types of products and parts during processing, storage, and transit, made of tough, flexible plastic, are said to be resistant to all common chemical reagents, such as solvents, sterilizing agents, caustic and acid baths, and will not chip, break, or shred under severe conditions. Non-threaded closures push on easily over pipe or tubing ends as caps, or insert readily in round openings as plugs; can also be used as dipping process inserts, and for masking of threads and parts during paint spraying. Available in sizes to fit any diameter from ⅛ to 1½ in., obtainable in special sizes up to 3½ in. Stock sizes range from 5/16 in.-24 thread to 2½ in.-12 thread.

CaPlugs Div, Protective Closures Co, 2207 Elmwood Ave, Buffalo 22, NY

Precision + Speed + Power

. . . THIS VERSATILE MACHINE CAN REPLACE 2 OR MORE SINGLE-PURPOSE MACHINES

KNIGHT'S NO. 50

Vertical Milling & Precision Boring Machine

Here is combined in a single solid-base machine every essential feature for milling and accurate boring—with ability to accomplish an extreme range of difficult or unusual work invariably done on two or more machines.

Work transfers are entirely eliminated
Set-up time is reduced to a minimum

Table feeds from 5/16" to 20" per minute plus rapid traverse in all directions. There are 16 Spindle speeds from 40 to 2000 r.p.m. and infinitely variable boring feeds from .0005" to .010"

Convenient quick-action controls—full-vision work areas—easy operation. Powerful all-gear 7½ H.P. drive—extra-rugged construction.

Write For Catalog

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3926 W. Pine Blvd., St. Louis 8, Mo.

Send catalog on No. 50 and other Knight Milling Machines.

Name.....

Title.....

☐ Send information on Knight's 20" and 42" Rotary Tables.

KNIGHT VERSATILE MILLERS ACCURATE - RIGID

W. B. KNIGHT MACHINERY CO.
3926 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI

PENINSULAR GRINDING WHEEL CO.
saves time and labor, does a better job with

FARQUHAR Hydraulic Press

Five years ago, the Peninsular Grinding Wheel Company, Detroit, Michigan, installed a hydraulic press. Peninsular wanted a press that could mold grinding wheels quickly and well—with a minimum of rejects, that would stand up for many hours of constant use—so it chose Farquhar. And Farquhar does the job! In operation 16 hours a day, 5 days a week, this 300-ton model works smoothly and satisfactorily, cutting time and labor costs. Peninsular particularly likes Farquhar's easy pressure setting and the short ram stroke required —two of the many Farquhar features that contribute to its dependable, money-saving performance.

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in modern production. Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost.

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for free catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: THE OLIVER CORPORATION, A. B. Farquhar Division, *Hydraulic Press Dept.*, 1506 Duke St., York, Pa.

THE OLIVER CORPORATION • A. B. FARQUHAR DIVISION

Tangents by Tange

BIRDS

Production men are funny birds. Most of them I know are inclined to resent vacations and conferences and lunch hours—all take too much time. And production men don't have time enough to get half their jobs done.

Power engineers and design engineers and storekeepers and doctors and lawyers — all these men have time occasionally to shoot a game of golf, or just to shoot the breeze. Not production men—too much to do.

Maybe it's my consciousness of this that keeps me hollering around our shop about shorter, more compact articles, more pictures and drawings, more time to prepare a story so it takes less time to read.

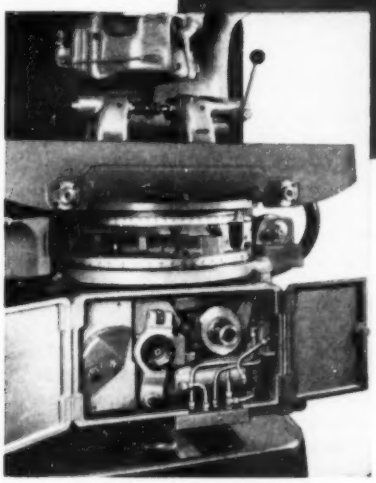
That's quite different from the approach on general magazines. There the author writes beautifully, takes a small incident and expands it into a 7-part story with love, sex, and intrigue thrown in. He's hoping to get you to spend your time being entertained. The editor provides entertainment to keep his covers apart and to get you to buy his product.

Not us. Our consciousness of the chronic shortage of your time makes us work like sin to save it for you. We try to be your eyes and ears in Metalworking all over the world—

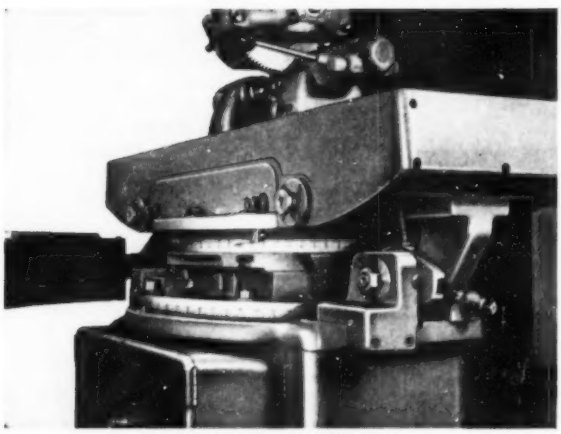
"The engineering department worked day and night for three months to make these changes. Can you have them in production by three o'clock?"

An Important Contribution

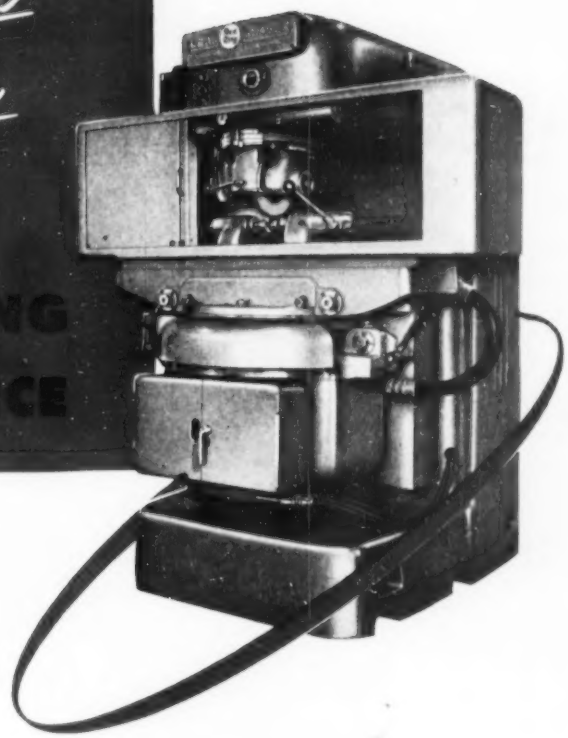
To GEAR SHAVING PRACTICE



Differential up-feed mechanism



Crowning cam and bracket



Two new features are now optionally available with the Red Ring Gear Shaving Machine Model GCU — Automatic Differential Up-feed and Conventional Crowning. So equipped, any of the recognized processes in the field of rotary gear shaving may be performed on this machine. It thus becomes economically applicable to both high production and to job shop operations and to gears of all characteristics within its size range.

Specifically the Model GCU with these additions can be used for:

(1) Diagonal shaving at fixed center distance on a two stroke cycle.
(2) Diagonal shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(3) Conventional shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(4) Precision gear crowning accomplished by rocking the table during any conventional shaving cycle.
(5) Taper shaving to specification.

Automatic cycling is precise and very fast. Production rates are high and cutter life has been increased to as much as 200%.

Write for Bulletin S53-7 which gives all the details of this important new development.

6501

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

SPEEDY Zagar-Broaching

• Singly or in production lines, three Zagar broaching machines broach small and medium size parts with eye-opening speed and accuracy. Profitable uses: keyways in gears, hubs and pulleys; hexes, squares and irregular holes; sizing holes to close tolerances. Simple, fast, easy to learn; costs little to buy, little to operate. May we study your needs?

Write for Engineering Manual "A-10"

Zagar — TOOLS FOR INDUSTRY and SPECIAL MACHINERY

ZAGAR TOOL, INC.
24000 LAKELAND BLVD.
CLEVELAND 23, OHIO

and even in closely associated industries. We pick and choose to provide you with what we figure will help you most. Our editors dig everywhere, into everything.

Then we take one big step more. We put the whole thing into our editorial press, spend hours, days, and weeks getting rid of non-essential parts—of the entertainment, if you will—wording as compactly as possible, converting words to quicker-to-understand pictures, arranging the story in orderly sequence. That's not common, even on technical magazines. But we think it is vital—to save your time.

Sure, we write tricky headlines, use cartoons, and make intriguing typographic arrangements to make it interesting. That's to make useful data easy to take. We try to provide our good medicine in short, palatable doses.

That's because we know every man has a loafer inside who really works like the Devil to find excuses to keep the man himself from doing anything that's for his own good. And that personal Devil embroiders all his successes with an intricate tracery of "saving time." Add that to the fact that a production man really is busy, and you've got a tough nut to crack.

But that's the nut we're trying to crack. And, every so often, we find we've done it. Some hardboiled production man admits he's reading *AM* only—because that's all he has time for. Then we swell up fit to bust, and try to keep on giving him more than his money's worth—we try to give him his time's worth.

TIME VS CASH

Time as a saleable commodity has always intrigued me. It is the stock in trade of a consulting engineer and

"Steel lockers, showers, we can't have everything fancy like big industry, Chips, but commencing Monday I'm putting in LILAC SOAP!"

even of the engineer in industry. Both live off it as a source of income, but no one can measure its real value. The time that is piddled away on telling about last night's party, the coming election, on office politics, or in other familiar ways is the equivalent of throwing away that much in cash, which no bread-winner would think of doing, were it his own. Some of it is called "relaxing", or "morale-building", or "cobweb-clearing"—but let someone suggest that the man who indulges be docked, or the man who doesn't indulge receive the equivalent in added income—and the outcry can be heard for miles.

Or consider the visitor who comes in for information. Employees are expected to show common courtesy and give him whatever time may be necessary to answer his immediate need. He may be escorted through the plant, given any data not restricted, and otherwise shown every attention. It may take several hours for several men, at their salary cost plus the overhead. That's all OK—even wining and dining if he shows potential.

But to give him the equivalent in cash is not. You can tell him something that is in a standard textbook, but can you give him the book to save your time? You cannot. He'd resent the necessity of reading to get his dope, and the company wouldn't honor the expense account.

What a paradox! You can give him $50 worth of time, no questions asked, but hand out $50 in company property, and you're at least a fool, and probably a thief. By the same token, you can fritter away $20 worth of company time on your personal affairs or on office tomfoolery, and no trouble results, but lose $20 cash and you make it up.

Yet what is industry's most-valued

"Jason's a good man. He doesn't believe in wasting company time!"

Ready for you after 12 months of brutal

CUSTOMER TESTING!

CLARK's

New and Exclusive

HYDRATORK DRIVE*

Here's how it improves your fork-truck operation:

1. **MORE WORK:** faster get-away, positive power without slippage; moves heavy loads and climbs ramps with ease.
2. **LOWER COST:** higher percentage of "on-the-job" time results from no clutch problems, "cushioning" effect on motor and drive members.
3. **GREATER SAFETY:** hydraulic brake system, linked to torque converter, automatically cuts power; engine cannot be started unless controls are in neutral.
4. **IMPROVES DRIVER EFFICIENCY:** finger-tip direction control and elimination of gear-shifting conserves operator energy.

Not one, but *eighteen* HYDRATORK-equipped trucks were placed in customers' plants for a full year of on-the-job testing. Without exception, these units proved that reduction in driver fatigue and of truck downtime results in greater production from HYDRATORK-equipped trucks.

1903 CLARK EQUIPMENT

* *Now available in 6-7000 lb. capacity truck*

Mail the coupon for detailed literature which explains how CLARK's new and exclusive HYDRATORK DRIVE operates.

CLARK ELECTRIC, GAS, DIESEL, L.P. GAS FORK TRUCKS AND POWERED HAND TRUCKS · INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 3, MICHIGAN

Please send: ☐ Hydratork literature ☐ Condensed catalog
☐ Have representative call

Name_____

Firm Name_____

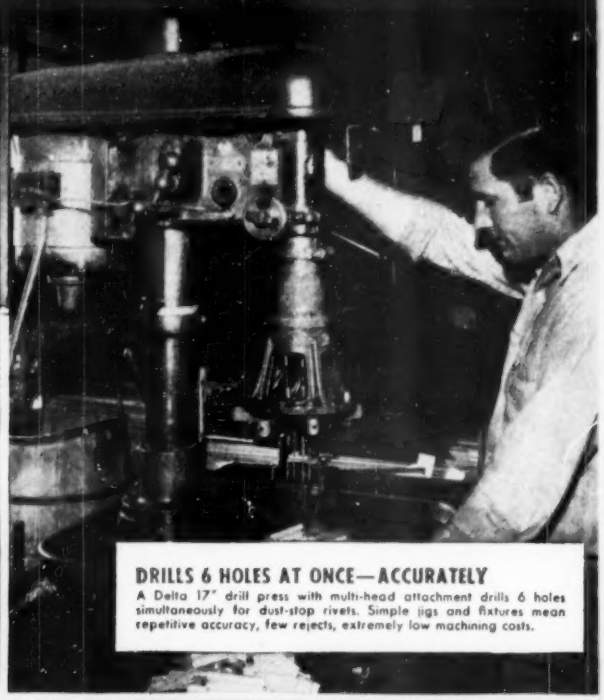
Street_____

City_____ Zone____ State_____

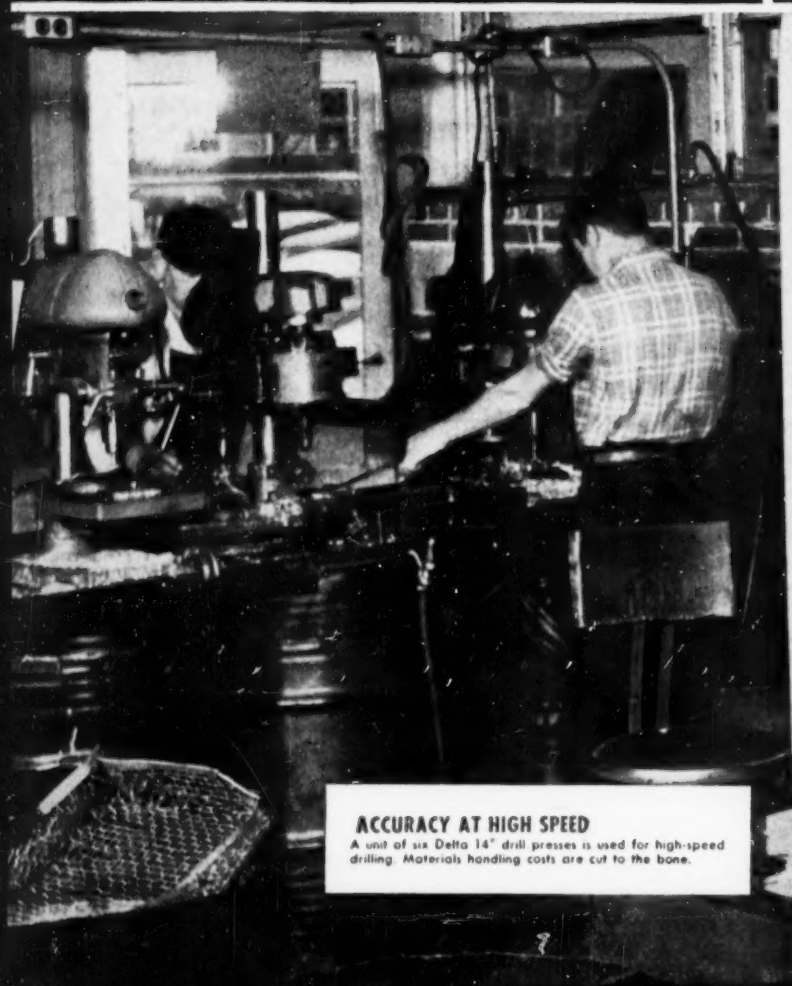
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

USING 21 DELTA DRILL

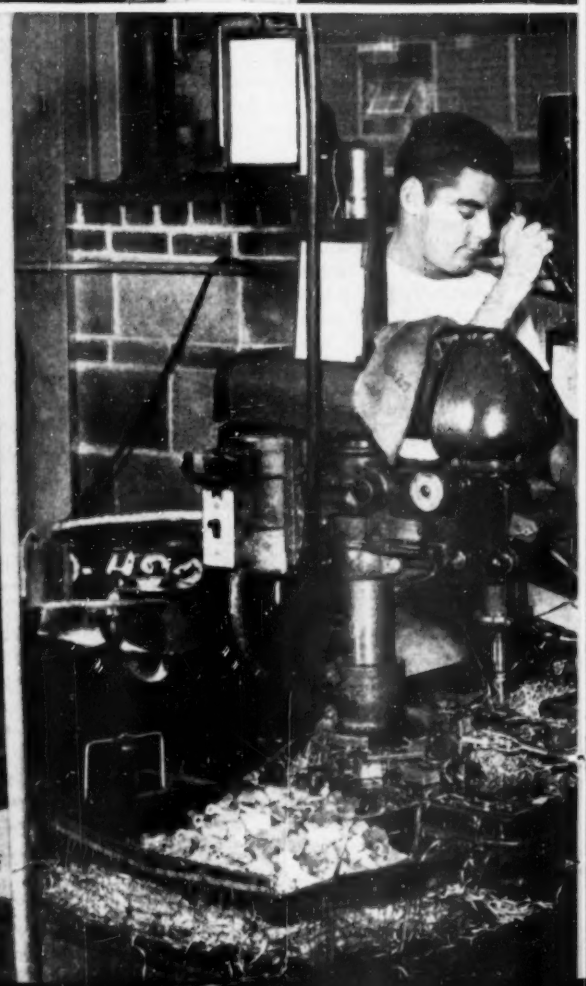
ONE OPERATOR, TWO MACHINES
Two Delta 14" drill presses operate in a fixture with collapsible tubes for adjusting the distance between holes and with an air clamp which operates automatically when the drill lever is pulled.



DRILLS 6 HOLES AT ONCE—ACCURATELY
A Delta 17" drill press with multi-head attachment drills 6 holes simultaneously for dust-stop rivets. Simple jigs and fixtures mean repetitive accuracy, few rejects, extremely low machining costs.



ACCURACY AT HIGH SPEED
A unit of six Delta 14" drill presses is used for high-speed drilling. Materials handling costs are cut to the bone.

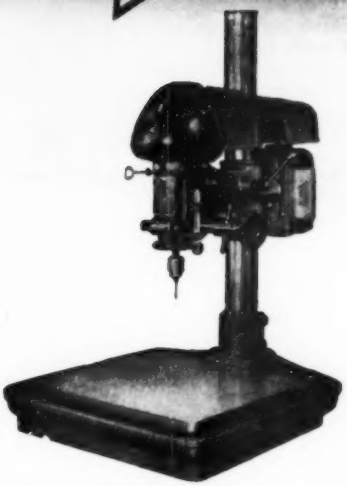


PRESSES, CUPPLES PRODUCTS CORP.

ELIMINATES SET-UP CHANGES...

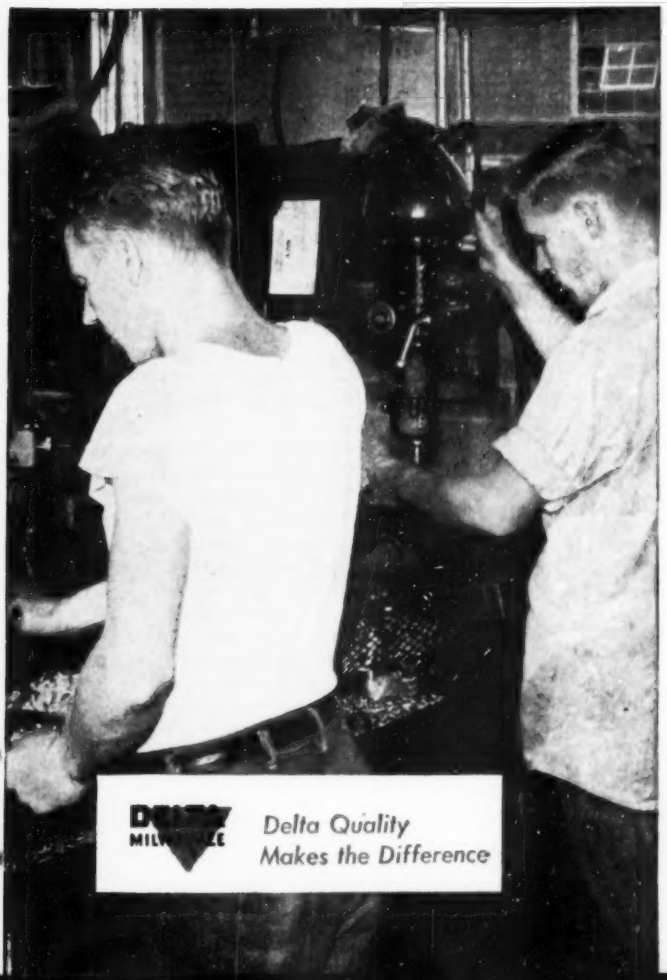
MAINTAINS INCENTIVE DIRECT LABOR EFFICIENCY...

SPEEDS PRODUCTION!



Plus ***gaining these added benefits that increase work flow:***

- **Less Materials Handling**
- **Greater Flexibility— Move the Tools to the Job, or the Jobs to the Tools**
- **Easier Operating Training**
- **Direct Savings in Labor Costs**
- **Negligible Maintenance**



For less than the cost of one major machine tool, Cupples Products Corp. bought 21 Delta drill presses, spotted them at key points in their production line and got the results listed above.

Isn't it "good business" to examine your own shop procedure and see if the Cupples plan won't work for you? It has in hundreds of plants. Ask your dealer about Delta tools—sturdy, light, accurate, versatile, mobile and best of all, very inexpensive.

Your Delta dealer is listed in the yellow pages of your phone book under "Tools" or "Machinery." If you'd like catalog AB52, which describes the complete Delta line, ask him for a copy—or write to: Delta Power Tool Division, Rockwell Manufacturing Co., 618K North Lexington Ave., Pittsburgh 8, Pa.

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

the new
universal
Burr-Master*
by
MODERN
. . . the high-speed answer to your gear burring problems !

A TRULY UNIVERSAL GEAR BURRING AND CHAMFERING MACHINE with these 8 OUTSTANDING FEATURES

*Patents Pending

1. Burrs and chamfers both spur and helical gears.
2. Burrs and chamfers both straight and involute form external splines.
3. Burrs and chamfers both sides and root of tooth at more than five teeth per second.
4. Two models for all popular pitch gears from ⅝ to 6½-inches pitch diameter and 3 to 9½-inches pitch diameter. Two-station models also available for added versatility.
5. Unskilled operator can change precision tooling for different parts in about 10 minutes.
6. No special tools required in making adjustments or changeover.
7. Machine automatically compensates for minor stock variations and out-of-round conditions.
8. Extremely long tool life.

Get the answer to your gear and spline deburring and chamfering problems today. Ask for Bulletin 103-60.

14230 BIRWOOD AVE. MODERN DETROIT 4, MICHIGAN
Industrial Engineering Co.

commodity and chronically short commodity? It's still the same thing —time. Ever think about how you feed and sleep a visitor for days, and his thanks when he leaves squares the account? He wouldn't think of offering pay. But if he makes a phone call or uses one of your stamps, both of you are put out unless cash changes hands. Why? What could be sillier? The cash covers a bagatelle beside the major expense. Yet the same custom exists in industry—you pay for your phone calls and your stamps, but not for the much-more-expensive time you use making the call or writing the letter.

PARALLEL

All this has a parallel in our business, too. Somebody who wants information or the answer to a particular problem writes us a letter—and encloses postage for our reply. The letter may ask for the layout for a forge shop, plus the equipment list and sources for supervisory personnel (Yep, we've had 'em like that!). Or it may be for a small bale of data to be incorporated in some college thesis. The cost of preparation may be fabulous—but the inquirer meticulously provides three or six cents postage for the return letter.

—EJT

ROUND TABLE Discussion

JUNGLE LAW

How much responsibility has a foreman toward his company in the matter of lining up and training a successor, particularly if he is considering leaving the firm eventually?

LOYALTY IS NOT JUST a something which only the operator and the foreman have to give; everyone has it and everyone can give it to colleague, foreman, or company. Companies also have it and all should be as ready to give as to receive. If all concerned observe the rules, no capable foreman need fear the consequences of preparing an assistant and successor. If the rules are observed by the company, the company is justly entitled to expect the foreman to show his loyalty to the extent of preparing someone to one day fill his shoes.

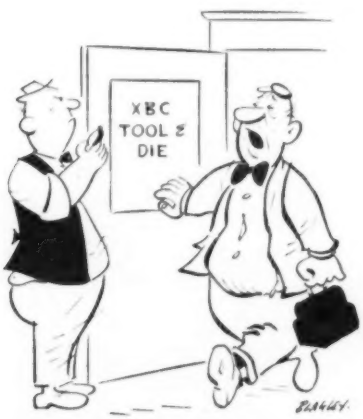
Admittedly, such a degree of trust must be mutual if both sides are to

benefit. Enlightened companies and private employers now agree on the benefits to be gained by moving around in search of experience or more immediate material benefits. If a foreman has given of his best during his term of office, he need have no reluctance about signing on with another company, provided inquiry makes it clear that the new company's record is satisfactory in the matter of loyalty to its employees. A change-round of personnel in industry is all to the good; the mover is sure to find something of interest in each new move and is just as sure to take something of interest with him to each new shop. In this way interest is aroused and heightened, quality and performance are improved and quickened.

Whether or not a company can expect loyalty to the extent of requiring the foreman to train a successor, will depend on how much loyalty the company inspires in the foreman. It is a mistake for a company to frown on an effort by a foreman to improve his lot in life, if it is not in a position to hold out an equal or greater inducement. Some companies are notoriously one-sided in this matter.

In answer to a box-office advertisement, I once had the misfortune to apply for a job with the company who then employed me and, as a consequence, it was made abundantly plain to me that any hopes I might have entertained of advancement within that company could be abandoned for all time—this, in spite of the fact that they had taken me from another company a few years earlier.

A capable foreman colleague in a large factory applied for another job, to a box-office number. He was finding difficulty in hitting it off with a new general manager and although the advertised job carried less money than he was then earning, he was



"Sorry, I'm late, Chief. The milkman left me on the wrong doorstep this morning."

CHIPS

that spoil finishes, cause excessive tool wear and cost you money are removed by the

FRANTZ

FERROFILTER®

MAGNETIC SEPARATOR

Here's an answer to getting longer tool life and more production between grinds—as well as finer finishes. The FRANTZ FERROFILTER provides an effective means of extracting ferrous chips and fine particles from coolants. Installed in the coolant line, this magnetic separator thoroughly cleans the coolant by removing abrasive, magnetic particles—and also saves pump wear and maintenance. Used also on lubricating oil and hydraulic oil systems to protect critical parts from particles that bridge the oil film to cause wear, sticking or jamming.

Let us tell you how you can try the FRANTZ FERROFILTER on the job in your own plant.

Send for BULLETIN PM-57

S.G. Frantz Co., Inc.
P. O. Box 1138 Trenton 6, N. J.

Manufacturers of Permanent Magnet and Electromagnet Separators

These wrenches stand up on tough jobs long after ordinary wrenches have to be scrapped.

That's because they are scientifically designed and drop-forged from improved quality carbon steel and then heat-treated for additional strength to Williams exacting specifications. Openings are milled or broached, surfaces and edges smooth, sizes stamped on heads, hardened and black enameled (baked on) . . . heads polished bright.

When you work with a Williams wrench, you'll recognize its quality and utility at once. When you consider there are nearly 1000 sizes in a wide range of patterns, you can be sure of the right one for the job. Reason enough why the Williams brand is the "buy" word for those who want quality and service in a complete line of carbon steel wrenches.

Your Industrial Distributor can supply your requirements from large stocks.

J. H. WILLIAMS & CO.

540 Vulcan St., Buffalo 7, N.Y.

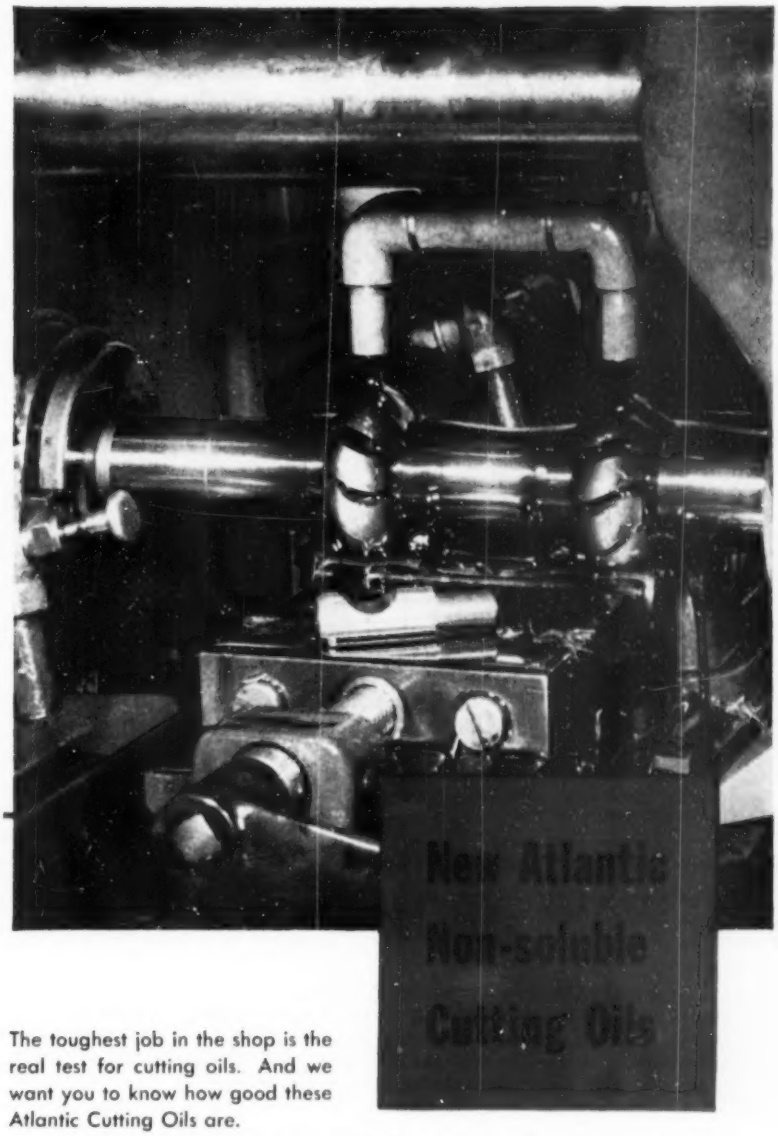
AVAILABLE INDIVIDUALLY AND IN SETS. *Catalog 301 shows the broadest line of its kind. Describes and Details:* **Engineer's Wrenches, Check Nut "thin" Wrenches, Hex-Box Wrenches, Square Box Wrenches, Tool Post Wrenches, Structural Wrenches, Construction Wrenches, "S" or Car Wrenches, Face, Pin, Hook, Adjustable-face, Adjustable-Hook Spanners, Socket Wrenches, Adjustable Wrenches.**

prepared to drop a bit in the circumstances. He was surprised to learn, in due course, that he had applied for his own job and more than surprised to be told that he could retain his job at the advertised figure. This will seem hardly credible to a younger generation of foremen, but it happened in the bad old days of slumps and mass unemployment when there were many more good foremen than good jobs. Loyalty begets loyalty, and if confidence is to be inspired, all sections must make their contribution. One way of improving matters in this respect would be for all advertised jobs to carry the company's name and address; the box-office number is suspect, and should definitely never be made use of to penalize an applicant.

Al and Ed have formed an opinion of their own concerning the company they serve and to Al and Ed, Reynolds represents the company. Al admits the company is a good one but seems to feel there is no future, or, at least, no immediate future in it for him. He seems to doubt Reynold's integrity, fears that if he produces a good understudy, Reynolds will find some reason, or excuse, for preferring the second string to him. That fear may cause him to be cynical towards Reynolds but in spite of Al's haughty reference to the training of an understudy, it is always regarded as one of the duties of a foreman to have a good second in the offing. Al's whole attitude to the problem of making a move is somewhat theatrical and exaggerated, a wrong attitude, of course, and if persisted in, is likely to lead to trouble and annoyance all round. A month's notice is all that is called for; if it is accepted without demur, Al can conclude that he has outstayed his welcome. If Al is really serious about a shift, he will be well advised to concentrate on getting fullest particulars concerning the possible new move and to compare them closely with his existing job. That would be more profitable and helpful than merely to doubt his chief's honesty

"Go ahead, George. ASK him!"

Try them on your tough jobs first



The toughest job in the shop is the real test for cutting oils. And we want you to know how good these Atlantic Cutting Oils are.

So try them on your tough jobs: deep hole drilling, threading, difficult milling. You'll notice results that you perhaps never had before: Long tool life, superior finish, cool work, freedom from foul odors, ability to see the work right through the oil. These oils are compatible when blended even down to the heaviest grades.

Your operators will like these new oils, too. Because they don't indelibly stain hands or clothing. They mean a cleaner shop—something everybody will appreciate.

Atlantic engineers have prepared a valuable new Cutting Oil Selection Chart. It shows how to select the proper cutting oil based on cutting oil efficiency rather than chemical composition. Get your copy. Write your nearby Atlantic office listed below, or The Atlantic Refining Company, 260 South Broad St., Philadelphia 1, Pa.

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SALVAGE 95%
...of unproductive tool-change time

"Get Greater Precision, End Chewed-up Shanks"

"Eliminate Keys, Collets and Wrenches"

TO OPEN—Grip sleeve, pull down; jaws open automatically and tool is released.

TO CLOSE—Insert new tool, grip tapered part firmly; tool is locked in place.

Equip your drill presses, boring mills, jig borers, milling machines, lathes with

AMF WAHLSTROM *fully automatic instant change* CHUCKS

SAVE TIME—Changing tools in an AMF Wahlstrom Chuck takes only 2 or 3 *seconds—not minutes!* No waiting for the spindle to stop! No hunting for keys, collets or wrenches! Four hardened and ground jaws automatically center the tool and provide a grip that can't slip, can't chew up shanks. The greater the load, the tighter the grip!

SAVE MONEY—With AMF Wahlstrom Fully-Automatic Chucks on your machines, as much as 95% of the time usually wasted in changing tools can be converted into *productive* time—time that adds up to many hours per month . . . per operator.

SAVE CAPITAL INVESTMENT—A single spindle equipped with an AMF Wahlstrom Chuck does the work of *several* spindles . . . makes it practical to drill, ream and counterbore many different size holes successively, *without moving the work.* Model "A" (shown) available in two capacity ranges: 1/64" to 3/8" and 1/32" to 1/2". Other models for larger tools.

Ask your local industrial or machinery distributor for demonstration or write us direct for illustrated folder.

COMPARE Unretouched Photo

(UPPER) Tool used in Wahlstrom chuck. Note perfect shank. This tool has been repointed 17 times; inserted and removed 289 times.

(LOWER) Tool used in ordinary chuck. Note chewed-up shank. This can happen the *first* time chuck slips.

amf WAHLSTROM®
CHUCKS AND TAPPING ATTACHMENTS
FULLY-AUTOMATIC

See AMF's exciting, new television show, "OMNIBUS," every Sunday. Check local paper for time and channel.

and to indulge in a little cynical melodrama at the company's expense.

There is one point in Ed's remarks to Al to which, I think, strong exceptions could be taken. It is "Seems to me you owe the outfit something after all those years, Al." According to Al, he has pulled his weight during "all those years" so it does not seem very clear what he owes the company. In this connection, Ed would certainly seem to be asking too much, and without any very evident justification. In most of his queries, Ed is definitely asking a good deal of Al and more than many would agree to.

The whole question of loyalty to a firm seems to me to be linked to the matter of recognition by the firm. In this conservative old country—Britain—with its class distinctions and its age-long traditions, many good men—not only foremen—men in almost every walk of industrial life have never had their service nor their worth adequately rewarded. Many pass their working lives in occupations far beneath the level of their skill and learning, not from choice but because of economic necessity and the accident of birth. In the process, much good talent is under-employed at home and much, through emigration, has been gifted to other lands more ready to recognize and reward real worth. This struggle for recognition goes on unceasingly, even in high places.

A shining example of pettiness, even jealousy, in otherwise great men is to be seen in the case of Lord Reith, now chairman of the Colonial Development Corporation and, previously, creator of the British Broadcasting Corporation. In spite of his great talents, his wisely acknowledged capacity for work, and for breaking fresh ground, he was compelled to protest, during a critical part of our history against neglect and idleness amid plenty to do. He protested he was never fully employed in the war government and in an extraordinary letter to Mr. Churchill he expressed his disgust with candor, as follows:

"Even in office I was nothing like fully stretched; and I was completely out of touch with you. You could have used me in a way and to an extent you never realized. Instead of that there has been the sterility, humiliation and distress of all these years — eyeless in Gaza — without even the consolation Samson had in knowing it was his own fault."

The great Conservative Party, of course, held Mr. Churchill himself at arm's length for years and years because they feared him, and Mr. Churchill, in turn, side-tracked Lord

Are you wasting dollars on over-finishing? Here is the problem and a suggested solution from Brush Electronics Company...

How surface finish control can help you reduce your machining costs

By F. W. Witzke, Application Engineer, Brush Electronics Company, Cleveland, Ohio

PROPER surface finish control may well give you big savings in your plant by reducing production costs, increasing production rates and improving product performance.

Directly or indirectly, the factor of surface roughness affects almost every physical, mechanical and economic consideration of a machined part.

Overfinishing is costly

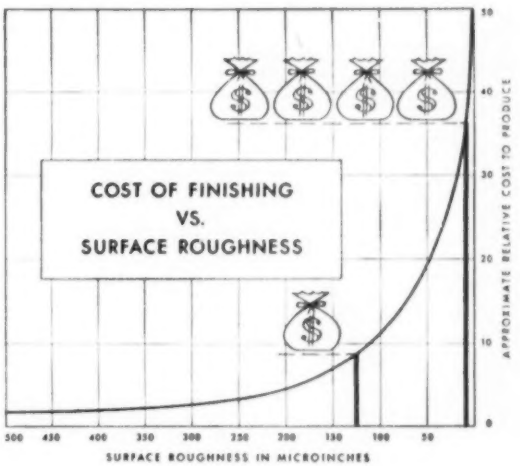
The chart at the right shows how finishing affects the cost of machined parts. For example, if the surface finish is specified as 125 microinches and you are overfinishing to 8 microinches because of lack of proper gaging equipment, your finishing costs can be four times as much as necessary.

To eliminate this costly overfinishing, actual checks of machined surfaces should be made in the shop to be sure that specified values are not exceeded. On mass production items, a reduction of a few cents per piece in machining may save thousands of dollars per year!

Surface finish control conserves machine capacity

By eliminating unnecessary operations you effectively increase plant capacity without additional investment. In this way surface finish control helps you increase production rates.

Periodic measurements of machined parts being processed also provide an excellent indication of when cutting tools should be replaced or dressed, because surface roughness increases rapidly with tool wear. Since many factors such as the tool, material, cutting speed, feed, etc., all affect the finish, proper information about finish helps you operate at optimum conditions, and higher speeds.



Improves product performance

Proper surface finish control affects more than production cost. It can influence many factors in product performance, such as:

Break-in Time	**Bearing Load**	**Adhesion**
Wear	**Reliability**	**Reflectivity**
Noise	**Heat Transfer**	**Leakage**
Appearance	**Friction**	**Galling**
Corrosion	**Lubrication**	**Safety**
Dimensional Tolerance		**Fluid Flow Resistance**
Fatigue Strength		**Tensile Strength**

Fortunately, there is now a simple method of measuring surface roughness on the production line so that these important advantages can be realized.

Continued on next page

(Advertisement)

Brush Surfindicator*

...a practical shop tool for measuring surface roughness

The SURFINDICATOR meets the need for a shop instrument to measure surface roughness in production and inspection. This instrument, developed by General Motors Research Laboratories Division, and manufactured under patent license from General Motors Corporation, offers you the key to reduced machining costs, more efficient use of equipment, and improved products.

With this new, portable inspection tool you can make surface roughness measurements on the production line. The operator merely guides the pickup over the piece to be inspected, and then reads surface roughness in average microinches on the meter. This permits you to specify surface roughness in the design and then to measure it in the shop.

Using SURFINDICATORS, several plants in different locations can produce parts to the same surface roughness specifications. Here is the instrument that makes surface roughness measurement a practical shop operation.

Have you tried the SURFINDICATOR?

Visit us at Booth 1220 at the Metal Show and operate the SURFINDICATOR yourself. Or call your nearest Brush Electronics Representative for a demonstration.

BRUSH ELECTRONICS COMPANY, DEPT. U-10
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BRUSH 7 ELECTRONICS

☐ Please enter our order herewith for ..... Model BL-110 SURFINDICATORS, at $685.00 each, f.o.b., Cleveland.

☐ Please send booklet on the advantages of surface finish control.

Name _____

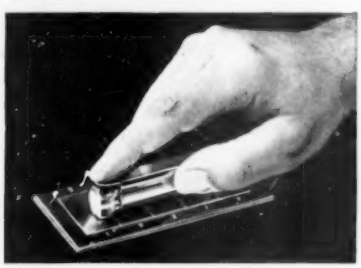
Company _____ Your position _____

Address _____

City _____ State _____

EASY-TO-USE... After brief instruction, shop personnel can make accurate measurements with the SURFINDICATOR.

PORTABLE... Weighs only 15 pounds and can be set up anywhere in the plant where 115 volts a.c. is available. Completely self-contained.



ACCURATE... Precision Reference Specimens permit calibration to an absolute standard, and enable you to check accuracy of instrument at any time.

Price of the SURFINDICATOR is only $685, f. o. b., Cleveland. It is completely self-contained, is ready to put to work. **Trade Mark*

Reith, probably for the same reason. Industry, of course, has its Churchills and its Reiths, their name is legion.

M Donald
Lanarkshire, Scotland

WHEN I HIRE OUT to take on a foreman's job the employer is particularly concerned about my ability to get the most work out of the men in my department. When the time comes, and he sees that it is to his benefit to do so, he greases the skids beneath me and gives me the old one-two and sends me on my way.

If I cut the mustard, all well and good, and if I don't you can't blame him one iota when I am let out. Anything that will contribute to a premature launching, when he finds it to his advantage to do so, he will relish and utilize to the full. You can't blame the guy one bit, and were I in his place I would do the same thing. You've got to take the bitter with the sweet in this free enterprise deal and remember, when the axe falls, you could be the one who is doing the swinging.

So, in view of the foregoing, I'm taking these things into consideration when anybody hints that I prepare someone else to take over in the event I should be absent. I would consider it the height of unmitigated gall for my employer to expect me to lubricate the guides on the guillotine so that he could, at his discretion, release the blade.

There's nothing like practical experience for convincing one of certain fallacies he has committed in his past life. In years past I had the same ideas as some other overly-trusting souls about breaking in a man to take over the shop. This chap struck me as being a square shooter and I put him through the preliminaries. Things went along fine while I was around, but just as soon as I left town on a short business trip my accommodating Mr X communed frequently with the big shot and when I returned there was every evidence of an approaching celebration. I could see that the block was being prepared, but that it didn't exactly fit my neck; from then on I stalked around the shop like the famous cowboy in The Virginian, with my hand ever ready for a quick draw. The double-crossing straw-boss, who had expected my head to fall into the basket upon my return developed such a severe case of frustratus that he either had to quit altogether or go completely nuts. Whether another man would have changed my idea of breaking in a substitute is a question. It's a funny thing how an impressive

SHELDON
CHICAGO U. S. A.

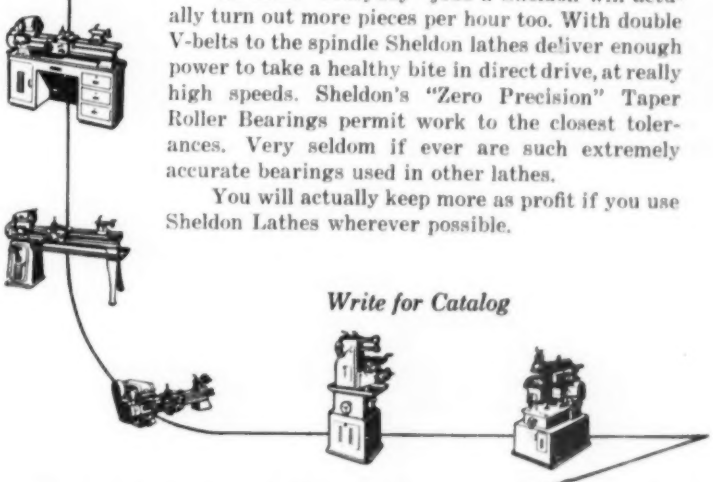
More will be *profit* with a Sheldon

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.

Write for Catalog



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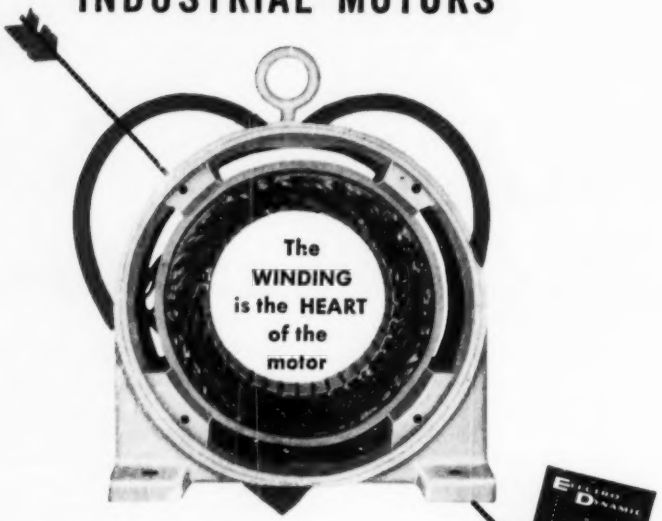
ELECTRO *xtra* DYNAMIC *ependable*

INDUSTRIAL MOTORS



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EXTRA INSULATION in stator slots and between phases
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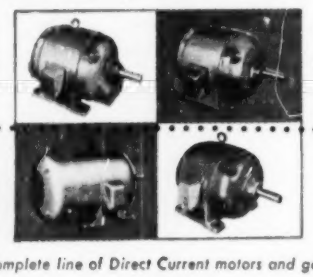
From 1 to 250 Horsepower (H. E. M. A. STANDARDS)



One-piece cast iron frames.

Extra large "free-flo" air channels.

Permanently aligned cast iron brackets.

Liberal size grease lubricated bearings.

Also a complete line of Direct Current motors and generators

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DIVISION OF GENERAL DYNAMICS CORPORATION
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lesson will imbed itself so deeply in the subconscious as to transform a trusting soul into a cautious survivalist.

If there is any thought of breaking in a man to take over, let the big boss do the handling of it. From my way of thinking it is up to someone other than the foreman to pick out a man for the job. My motto is: "Hands off." If one was selected, and I were asked to do what I could to break him in, I would do my part in putting him through the ropes, although I might not like the job in view of the experience I went through. I could either conform to the boss's wishes or get out.

I can readily see where I would like my interests to be watched after were I in the employer's place and you can bank on it that were I in his place I would take whatever steps necessary to protect them. But to ask me to do something that I knew would eventually result in me getting the short end—no siree! My end of the contract is fulfilled when I supervise the men and see that they do their very best to get the work out, but I'll be damned if I'm going to contribute to my own downfall.

Jack Everett
San Francisco, Calif

•

SALARY NO SECRET

Should a man's earnings be his private business? Will public knowledge of each worker's wage quiet curiosity or tend to arouse resentment among the men? Some readers say . . .

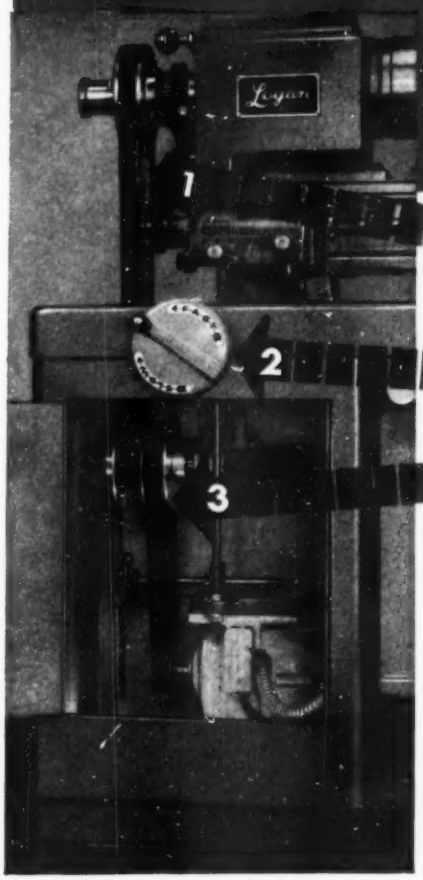
IF IT IS POLICY to withhold salary rates, it should not be changed at this time. An employee likes to know what every other man is getting, but would rather have his rate kept a secret. Even though everyone knows his rate he still feels that it is a secret. If the rates of the men are made general knowledge there are apt to be some repercussions. Each man will think that he deserves more than the other and will feel slighted if his rate is lower than some of the other men.

The only way to do this properly would be to give classifications and the rates for those classifications. If the classifications are posted and the men placed in these groups for a spread of wage rates, it will be better than actually listing the rate paid to each employee. In this manner two men can have the same classification and assume that the rates are the same, when actually the man with the edge can be getting slightly more than the other.

VARIABLE SPEED DRIVE

NOW OPTIONAL ON . . . Logan 12" SWING LATHE

At No Extra Cost



No. 2955-V
12" Swing Lathe with
Variable Speed Drive

Principal Variable Speed Drive Parts

1 Upper Section showing spindle V-pulley and Vari-Speed belt.

2 Vari-Speed Control

3 Lower section, showing Variable Speed V-Pulleys and Vari-Speed belts.

Belts are easily replaced. Spindle Speed Chart on gear guard provides clearly marked settings for various speeds.

SEE IT AT YOUR LOCAL LATHE DEALER'S,
OR

Write for Information . . .

Full catalog descriptions and price information on request. WRITE TODAY TO

Provides Infinite Spindle Speeds, 38 to 1575 rpm.

The rugged, accurate Logan 12" Lathe is now available with either standard V-belt Drive, or the new Logan Variable Speed Drive, *at the same economical price*. Where the work handled requires a variety of spindle speeds, the time-saving speed correction of the Logan Variable Speed Drive definitely reduces costs. On large diameter facing, for example, the optimum surface speed is maintained by simply turning the Variable Speed Control Handle as the cutter goes into the work. No need to stop the lathe. No belt shifting. One control handle provides infinite spindle speeds between 38 and 1575 rpm, with all speed changes made *while the lathe is running*. This new optional feature, together with such standard Logan advantages as the massively proportioned ball bearing spindle; the balanced bed with the two V-ways and two flat ways precision ground; and the convenient new carriage . . . make the 12" Logan the lathe for profitable work.

Brief Specifications of Logan 12" Lathes

Swing over bed and saddle wings, 12"... Center Distances, 23" and 35"... Turret Lathes Models have 43" bed length... 1⅜" spindle hole... 1" collet capacity... 16 standard V-belt drive spindle speeds, 35 to 1230 rpm... Variable Speed Drive Models, infinite spindle speeds from 38 to 1575 rpm.

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FOR CHROMIUM PLATED FINISHES WITHOUT THE USE OF NICKEL

Write for free data sheets and send a part for free processing

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THE *Chemical* CORPORATION

71 Waltham Ave., Springfield 9, Mass.

It is a strange attitude that an employee will assume if he feels or knows that he is getting two cents an hour less than the next man. In forty hours this difference amounts to eighty cents, but to the worker it is enough for him to quit and look for a new job. Many strikes have been brought about by a difference in two cents per hour.

When a new shop is getting into operation, it might be advantageous to establish and publish the rates of the employees and continue it as a standard procedure. What advantages are to be derived by using this setup, I don't know, except that it gives an employee the feeling that everything is out in the open and nothing is held up the sleeve of the management. To maintain this feeling, other facts and figures at various times should also be exposed.

Frank J Zarnowski
Rutherford, NJ

IT IS FELT THAT there are two divisions of this problem. Possibly both may have the same solution. Let us first, however, study the wages paid to the general run of clock-punching employees. Secrecy is perhaps the most dangerous method of trying to keep things undercover. There is no way known in which anything can be kept a perfect secret. Leaks always occur, even in the most secret of operations. People do talk and people have a human instinct to be curious. They mind other people's business and get into trouble. Yet we keep right on doing it. Why? Let's just say it is human nature.

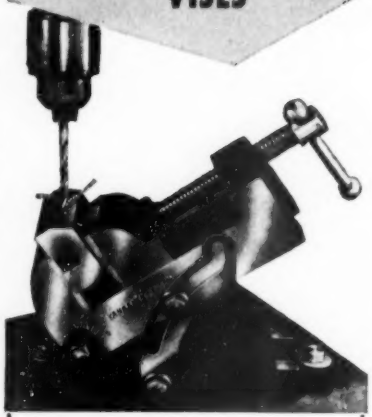
Now this being the case, rather than try to enforce a rule that seems practically non-enforceable, why not find another way to handle the matter. The first method tried was the hourly rate, and pay envelopes which carried no identification except the

"Still getting in as much overtime as you used to, Charlie?"

Jig in a Jiffy

"YANKEE"

ANGLE VISES



Easily converted to fast-acting, economical jig. Shortcuts costs on small jobs. Lock the work in the "Yankee" Angle Vise. Tilt for the angle and lock. You're set up for every operation . . . hand or machine. Also available with quick-release swivel base. Two jaw widths . . . 2" and $2\frac{3}{4}$". Each vise supplied with grooved "V" Block for holding rounds.

"Yankee" Ratchet Tap Wrenches for tight spots . . .

Ratchet needs only slight back and forth movement. Adjustable cross-bar for close-quarter work. R.H., L.H. and rigid adjustments. Knurled thumb piece for speedy starting in and backing out. Two lengths for 0 to $\frac{5}{16}$" taps, one for 0 to $\frac{3}{16}$" taps.

Write For "Yankee" Tool Book

NORTH BROS. MFG. CO.
201 West Lehigh Avenue
Philadelphia 33, Pa.
DIVISION OF STANLEY TOOLS

STANLEY
Reg. U.S. Pat. Off.

jingle of change in the envelope. With the advent of taxes and the necessity of report, it became necessary to indicate on the envelope the total pay. This again prompted curiosity; it caused petty jealousies and friction.

Companies began, not for this reason but for another, to study jobs and determine job descriptions. Along with this went job evaluation and rate ranges. The establishment of the rate range within a given classification was developed for the purpose of advancing employees who merited increases without changing classifications. This not only helped to increase productivity of the individual, but it also helped in controlling secrecy, and the actual amount that each individual made.

Job classification and rate ranges are published. Each person knows in what class of work each other employee works. Therefore, he knows approximately the net pay his fellow worker gets. The one thing which he does not know is the exact figure within the range. Somehow this does not seem to be of too vital importance to him; the major injustice seems to have been solved, that of classification and equal pay for equal jobs. More companies should think seriously about job evaluation and wage structure. It is a way to save money and to increase goodwill and productivity of workers.

So now we see that a method has been devised to reduce the old desire to know what the other fellow makes. It does not coldly say Jon Jones makes $50 per week and Joe Smith makes $45, which information can start a friendly feud, because certainly Joe feels he is as good as Jon when he is doing the identical work. Now if these jobs were classified it would be posted as job classification 8, wage range $1.10-$1.25, job description thus and so. In such a manner the work that both men are

"After today, the company will have to furnish me with a diamond to dress down the wheel. My girl wants her engagement ring back."

Westinghouse has everything for arc-welding anything... ...anywhere

No other company knows arc welding better than Westinghouse. That's why Westinghouse is able to supply equipment for every phase of arc welding . . . to provide the most complete line of arc welding in the entire industry.

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Westinghouse Welders by the hundreds of thousands are serving and saving wherever metals are joined. Why not investigate for yourself the benefits of doing business with us? Just call your nearest Westinghouse Welding Distributor, or write Westinghouse Electric Corporation, Welding Division, Box 868, Pittsburgh 30, Pennsylvania. For helpful literature, just fill out the coupon below. J-21811

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AM 10-53

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- ☐ B-5451 Welding Accessories
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- ☐ B-5453 D-C Arc Welder Type RA

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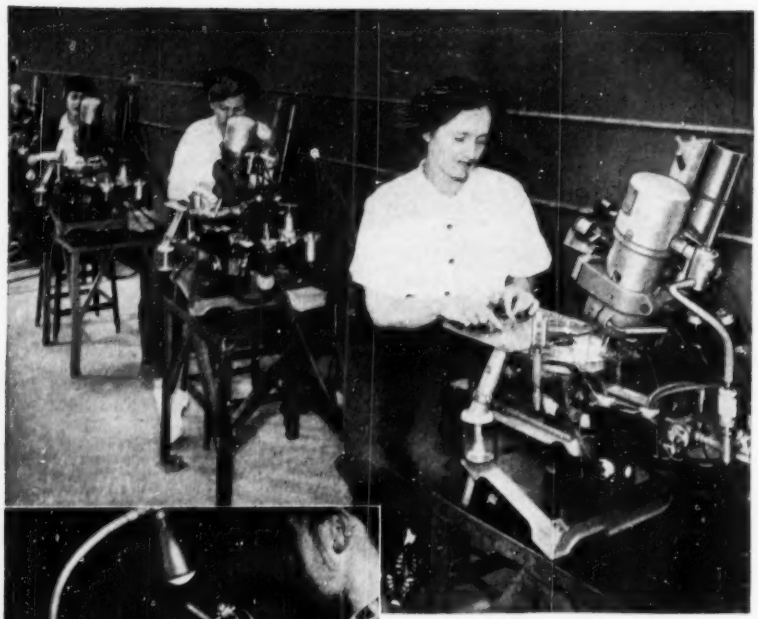
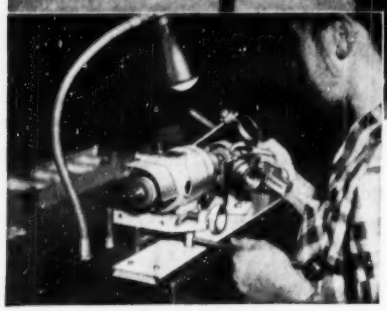
124,800 holes per day! ... using six DUMORE Automatic Drill Heads



Parts are hand loaded in an automatic indexing rotary table with 24 stations. Peak production has reached 23,000 pieces.



A Dumore Precision Drill Grinder is used to sharpen drills after a full day's production. Maximum drill life per grind has reached 23,000 holes.

Get amazing cost-reducing benefits with DUMORE tools

TALK about amazing production! One west-coast manufacturer uses six *continuous running* Dumore Automatic Drill Heads to drill tiny brass parts — at the rate of *20,800 per head per day.* The job calls for a No. 71 drill (dia. .026") and hole depth of .069". In addition to the amazingly high production, the user reports that the Dumore Automatic Drill Heads slash costs of drill breakage, down-time and scrap loss.

Amazing, too, are the results this company achieves using a Dumore Precision Drill Grinder to sharpen their drills for this job. They actually get a maximum of up to 23,000 holes per sharpening. That means a full day of continuous production for every Dumore sharpened drill, *without stopping to regrind.*

Get all the information about these tools — their capacity to increase small hole production — to eliminate operator guesswork — to provide completely automatic control. Ask your nearby industrial distributor for a demonstration, or write:

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The Dumore Company
1337 Seventeenth Street • Racine, Wisconsin

doing is covered. It is clear that Joe has not been working on the job as long as Jon, however, both men are satisfied that they are doing no more work than they should be doing and that they are being paid a proper rate for that work under a fair plan.

The second division of this problem deals with supervisory level personnel and salaried employees. The same condition has existed. Perhaps the same solution can be used. Where job evaluation has been employed it seems to have helped in these conditions. Naturally there is a little less desire, perhaps due to higher living conditions, of people in the upper salary brackets to be so curious, at least to the extent of, shall we say, "nosey." There is some tendency toward it, and perhaps the establishment of job classifications would assist in the salaried section of employment also.

Charles D Townsend
West Hartford, Conn

SO NOW WE ARE HEADED for subdividing a trade into several categories! One of the super-deluxe mechanic, another a second-rate super deluxe, another not so super and decidedly not deluxe, one who is worthy of two stripes, and finally the shop "yard bird" who thinks he knows a hell of a lot yet knows nothing of value, the latter being the lowest form of mechanic who has served his time and on account of lack of brains and effort gets tagged accordingly.

From one's point of view, a habit of thought passed on from generation to generation, a tradesman is a tradesman and, upon completing his four years of exposure, is rated as a journeyman who places himself with the rest. Up to the point where he stepped out into the cold, busy world to exercise his skill and knowledge as a mechanic he was, from all observations, a trained mechanic who was on a par with the rest of the fellows who had served their time. Invariably one will remain at his post and go along with the same old monotonous routine day after day acquiring a smattering of new experience, whereas if he pulled up stakes and courageously jumped from shop to shop, town to town, he would grow as a man and perfect himself as a broad-minded tradesman with a mind of his own, flexible enough to carry him through variegated channels of difficulty. Providing he didn't spend too much time with his foot on a brass rail bragging about his various accomplishments and returning to the shop the next

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Here at last is the only flux ever developed that makes possible the *non-corrosive* joining of all types of aluminum alloys by any soldering method—manual, dip or mechanical. No cleaning is required after soldering is accomplished—Aluma-Flux leaves no corrosive residue—soldered pieces are ready for use immediately.

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Soldered joints in aluminum produce no corrosive action due to flux residue when exposed to salt-spray, high humidity, alkaline water, etc. Aluma-Flux shows no detrimental effect on any soldered joint.

S-X Aluma-Flux can be used with 100% satisfactory results in powdered form as delivered, or in molten form—whichever is most efficient for the job. Virtually any type of solder can be used. Aluma-Flux can be stored indefinitely without change of weight, or any impairment of fluxing efficiency. Being non-hygroscopic, it will not absorb water.

In addition to its exceptional fluxing characteristics, Aluma-Flux offers many other cost-reducing, time-saving advantages . . .

The success of S-X Aluma-Flux in the soldering of aluminum is due to the action in which the flux initially reduces surface oxides and then immediately deposits a thin layer of plating material on the solder area. Oxidation of the area to be soldered is thus prevented while the plating material serves as an approved base on which to solder. In addition to its soldering efficiency, Aluma-Flux reacts completely during the joining operation so there are no corrosive flux residues to lower corrosion resistance of the finished joint.

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morning blurry-eyed, he might gain the benefit of traveling around.

How many of the fickle-minded metal busters do this? To some this jumping from job to job becomes an opiate under which they cannot withstand the confinement of the same shop for any length of time. However, regardless of their conduct in the evening hours, they do gain experience which in my opinion is far better than were they to remain as stick-in-the-muds in the old standby where they learned their trades.

Assuming that the traveling individual contents himself with reasonable lengths of work in one shop, and that he conducts himself with commendable decorum, he acquires much new experience before leaving for greener pastures. He does, as an individual, deserve as good a rating as the man who established himself permanently and can be depended upon to remain on the job. This roaming individual is no problem as far as turnover is concerned, as he takes hold immediately and can adapt himself to conditions very readily.

As to this system of subdivision, one will have to watch out for obvious difficulties. I'm afraid there will be so many categories that to acquire the proper niche for the individual workman the persons responsible for the proper classification will be continually suffering from headaches that no aspirin will assuage.

For example, let's take a few fellows and try to place them where they belong. Let's pick out the cream of them all: the man with wide experience who is undoubtedly one of the finest workmen available, who turns out work with the finish of an artisan—of unquestionable quality with rapid facility and who, finally, is cooperative in every respect with his fellow workers and his employer. There is no doubt whatsoever that the man is in reality rated at the best. We could go on with this classification with such minute degree of gradation as to make such a scheme one of impractical impossibility. If we were to limit the number of divisions to four, I see no reason why such a scheme couldn't be applied assuring a just result to employee and employer.

Samuel Hill
Denver, Colo

SALARY NO SECRET

WHILE THE IDEA of rating the worker according to his value, and not according to the job, is ethical and just, you'll find considerable objec-

tion to the idea because of the majority of the workers falling into the lower bracket. By such an arrangement there will be the chance of defeating the dissatisfaction which becomes a fertile ground for the agitator. No man will be satisfied with getting less than he thinks that he is worth, and under such an arrangement he cannot pit himself against the cold-blooded truth that there are others considerably better than himself. He sees a concrete reason for his station and will soon settle down with complacent resignation.

There is one great advantage in this category rating. It eliminates the daily gripe that a foreman has to tolerate—tradition seems to have it that that is a part of his job. It is no easy thing for a man to deal with a dissatisfied worker and to do justice to himself, his employer, and the workers under him. The old story: "I think I'm worth more than I'm getting," is one he has to put up with quite often. Another gag that makes his blood boil is: "How come that Tom Wilson is getting more than me?" If the foreman is honest and the facts bear out his opinion, he will reply: "Because he's worth more." Consideration for the applicant demands that he drag out the old skeleton and confide: "Things are not moving very fast these days and I don't think the old man'll stand for any increase at this time."

If for no other reason alone the scheme advanced by Al would pay for itself in consolation for the harassed foreman who has enough to do to look after the smooth running of production.

Justifiable rating can be handled by a select few who meet periodically—once a month or once in two months. Members of this committee should not consist of narrow-minded pen pushers, but experienced men able to appraise values. If the workers know that they will be rated ac-

"We're going to install it as our production line when competition starts playing rough."

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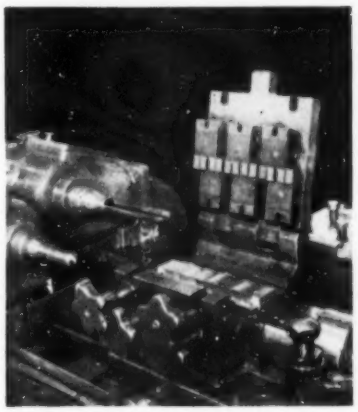
faster feeds • greater accuracy • less handling

More and more metal working plants are discovering how Hi-Standard Deep Hole Drills cut costs and produce more accurate results in drilling many pieces at once.



Gang drilling in fixtures

This method of "fixture drilling" many parts ganged together in one fixture cuts handling and drilling time considerably. By using forced oil feed through the drill, fast drill feed is permitted because it doesn't have to be withdrawn to clear chips. The constant oil flow cools the cutting edge and washes out chips to assure a smooth hole to size.

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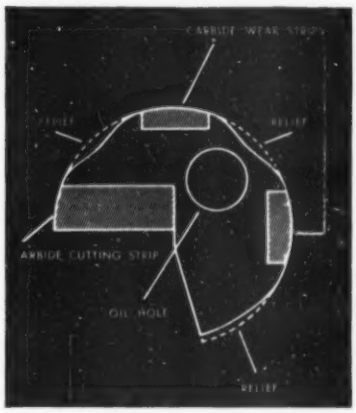

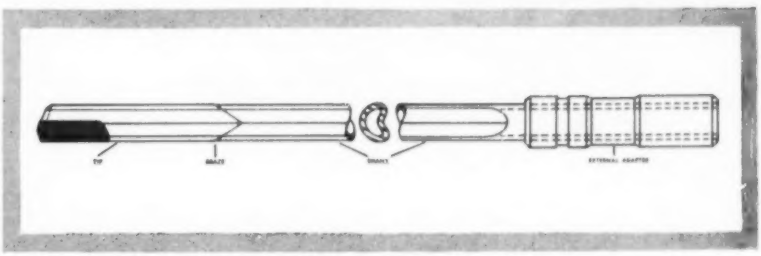

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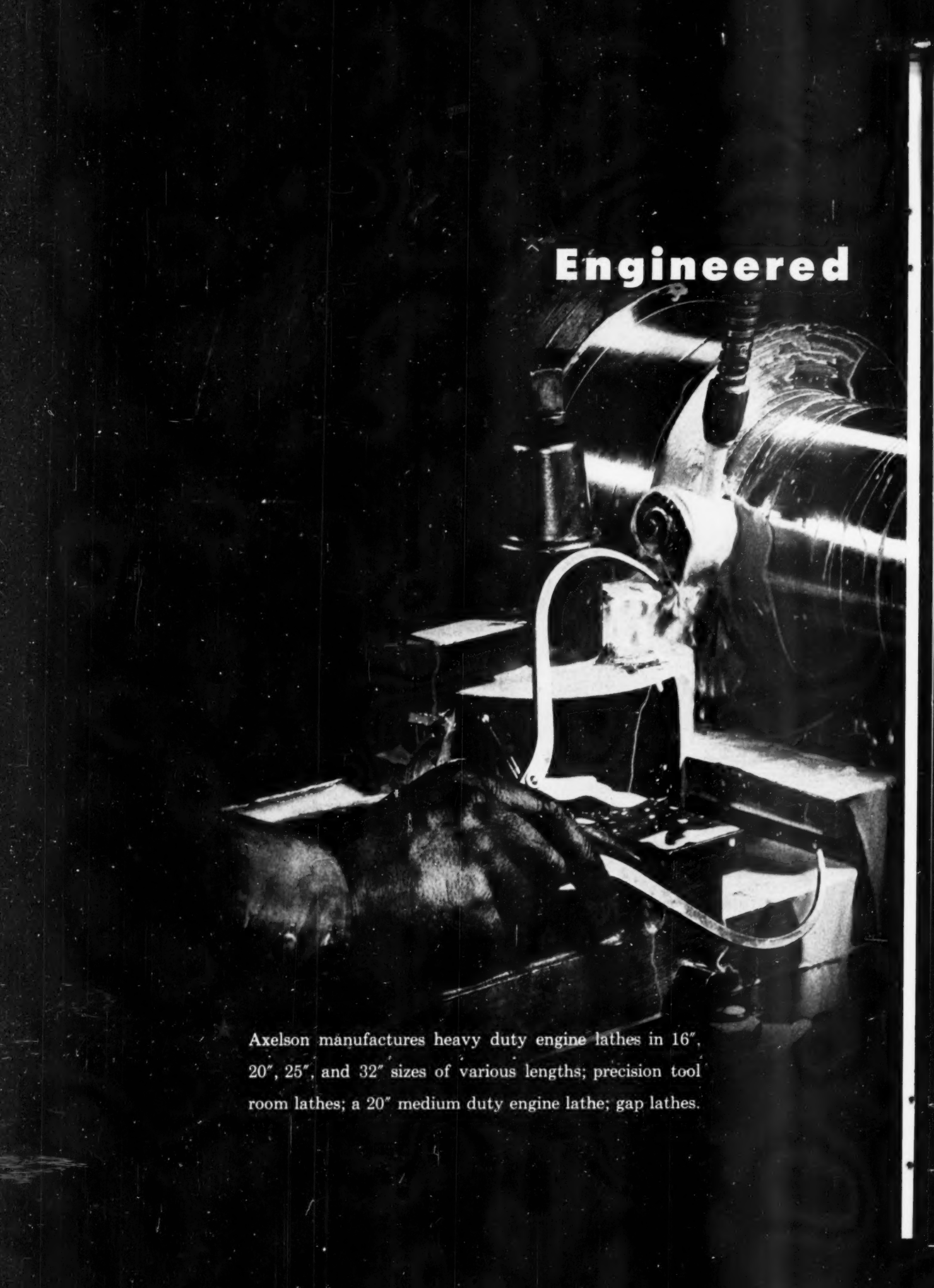

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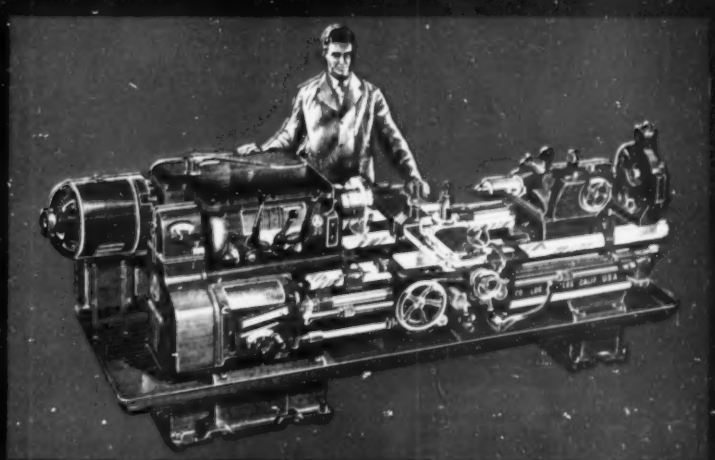

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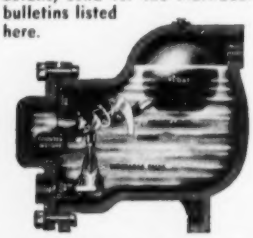

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cording to ability, effort, and quality of product, they will not be so inclined to complain without a justifiable reason knowing that the group is capable of correct reasoning. They'll hesitate in making such silly demands as to why they aren't paid the same as somebody else when they know that the individual is rated according to his true values. It could be made known to the men that the meetings are held for the express purpose of adjusting any unhappy situation as well as to make changes when they decide that those are worthy of consideration.

The objection that it is unwise to advertise what one is making is humorous in a way because such information is no secret any more. If one is a bachelor it might be possible to maintain one's private knowledge intact but when one has a wife who likes to spread the news around her friends, then murder will out.

From my viewpoint I don't care what the other fellow is making so long as I am satisfied. If I do happen upon some news that informs me that I am being unjustly dealt with in the matter of pay, then in all fairness to myself I'll either raise particular hell or else walk out and find me another job as I don't like to be double-crossed. If I were working under an arrangement whereby the workers were paid according to values, then it would be up to me to prepare myself for advancement by greater effort in acquiring skill or through further studies which will make me of greater value to my employer. If I am content with life and make no special effort to improve my condition—the old ah, to hell with it philosophy—then I have no one to blame but myself for the category in which I find myself.

Bob Roundbottom
Laguna Beach, Calif

HUMAN NATURE BEING what it is, I seriously doubt if there is anything to be gained by publishing the wage rate of every man in the shop. Because experience has taught me that the average man is not long in any shop before he has a pretty fair idea of what the men around him are taking home, especially if it happens to be a union shop. He also knows what the going rate is for his particular line of work and very soon knows what his chances are for a raise or promotion. To publish wage rates and classifications then, at least in the average-size shop, is to my mind an expensive form of redundancy.

Suppose an average-size shop decides to publish wage rates and go in for a numbered classification of the men. The logical choice for doing the classifying is bound to be—you guessed it—the foreman. To add to his other headaches, he has to sit down and mentally pass in review forty or fifty men. Maybe he had had his eye on one bright individual who shows promise of being good foreman material; very good, mark him number one. Be it also assumed then that prior to the classification Mr Number One has received several rate increases because of his outstanding ability. If the foreman decides to include several other outstanding men in the number one classification who haven't received as many rate increases, some very embarrassing questions are going to be asked when the wage rates are published. Of course, he maybe can get around that one by raising the lowest paid member of group one to equal wage status with the highest paid member, or else wriggle out of any wage increase by making his number one boy group leader. So it will go until the lowest classification is reached and every last man is properly pigeonholed, at least to the foreman's satisfaction.

What the men's reaction will be, is, of course something else again. Probably the only satisfied individual—next to the foreman—will be number one in group number one. When those classifications and wage rates are posted, a large percentage of the shop force are going to mumble in their beards and head for the foreman's office. I think the wise thing for him to do is to post the notice immediately before leaving for an afternoon's fishing and deal with the dissatisfied element when they have had a chance to cool off the morning after.

"Look at it this way—it's like sergeants in the army, only THIS guy they call a foreman!"

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The engine lathe you buy today could be the one you will call upon for 'round-the-clock production. Make sure, before you buy, that the lathe of your choice can take such punishment.

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MAKE SURE OF THREE POINTS

(1) That all gears are arranged in a horizontal plane; easy of access.
(2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches; eliminating gear wear due to shifting action.
(3) That the "back gear" is in *front* of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.

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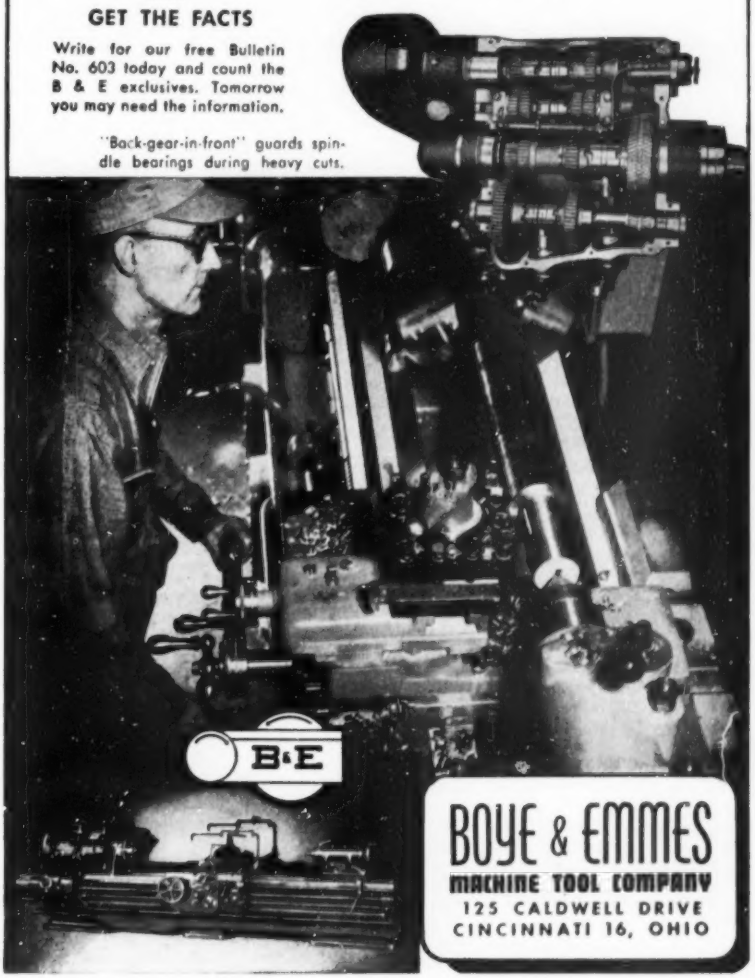

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Then again, it is reasonable to assume that the classifications will be reviewed and revised at regular intervals. Some of the boys are bound to feel they deserve to be elevated to a higher status when the next classifications come out and are going to make their feelings vocal. Which makes it certain that Mr Foreman is due for an ever-recurring cycle of headaches.

Having worked for the government prior to and during World War II, I can remember what happened when the quarterly efficiency ratings were posted. As these ratings had a direct bearing on a man's promotion and indeed his retention in the service when the budget was reduced, their posting was looked forward to with mixed feelings. The gain or loss of several percentage points caused many a private vendetta where friendship used to flourish.

I think our friend Al with his classification scheme is well intentioned but foolhardy—like the fellow who got the tiger by the tail.

Robert S Alexander
Greenville, RI

WHAT A MAN EARNS is a matter between himself and his company and most men would resent the company listing his earnings or giving him a salary rating for all to see. If a company should contemplate doing this they should, of course, include all foremen, the superintendent, general manager, all vice presidents and the president.

I cannot imagine any good that could come from such an action, but I can easily imagine the widespread dissatisfaction that would ensue. The workmen who were getting high pay would be spoken of as "the foreman's pets"; the lower-paid men would have a heck of a time explaining to their wives how come that Smith, Jones, and Robinson took home more pay, and those men who use all their savings to improve their homes and living conditions in order to make their families happier and better citizens would probably start looking around to see if they could find a position with some other concern that was not so fond of telling the world all about their employees' private business.

Russia is at present trying out the idea of advertising the men who are top producers, but so far the publicity does not seem to have resulted in more friendliness between the workers and the bosses.

The only place where it seems advisable to let the world know what everyone is paid is in government

GREAVES

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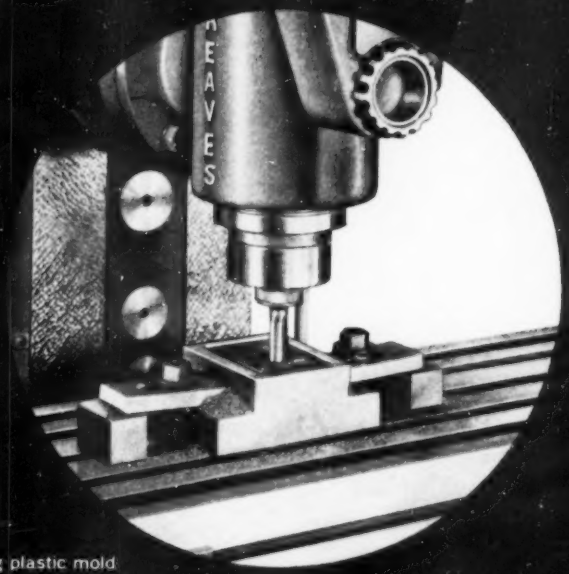

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and municipal positions for since the common people are actually paying these salaries by general taxation, it is important that they know, at least to some extent, what is being done with their tax money so they can thus make some kind of a check on what service they are receiving for their money.

A man who enters into an agreement with a concern to do certain work for an agreed-upon payment is surely entitled to have the entire matter treated with confidence—if he so desires.

George P Pearce
Albuquerque, NM

SALARY NO SECRET

HAVING WORKED UNDER and with both philosophies of wage information, "Keep It Secret," and "Tell the World," I believe it is best for all concerned if wages and salaries are matters of public information. I know executives are very jealous of their salary figures and always want to keep them secret, but I still think there is no great harm done in making that information available to all, and there is this good accomplished:

1. Publication of wage rates stops all prying.
2. It tends to do away with favoritism and the creation of "teacher's pets."
3. It tells all definitely what the prize of success is, and it offers an inducement to those willing to pay the price to win a prize.

When wage rates and salaries are matters of common knowledge, idle speculation ceases. A certain amount of envy may exist, but envy always has and always will exist. Universal dissemination of salary information such as we had on the railroads forty-five years ago, hurts nobody.

I remember distinctly that as a boy

"Said they'll be in a little later!"

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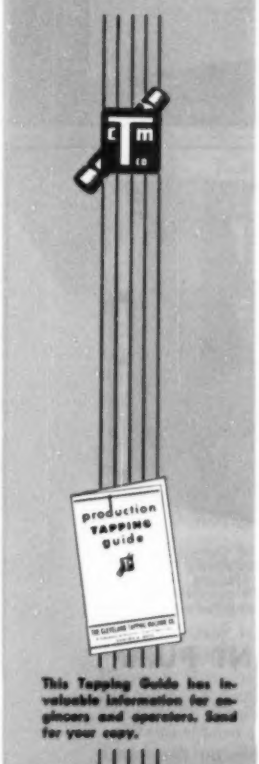
and working as a clerk in the mailing room, I drew $30 a month for twelve hours' work a day, 365 days a year. The ticket agent, one of the top brass, drew $187.40 per month. The passenger trainmaster drew $267.25 per month, and the division superintendent $440.00 per month. I can vouch for those figures because I stood in line behind those gentlemen in the pay car and watched them draw their pay. Everybody knew what everybody else drew—so what?

On the other hand, and under the secret system, I've known many bosses who had relatives, favorites, and sometimes stool pigeons to whom they paid ten or fifteen cents more an hour than the rest of us. Published rates tend to do away with that sort of thing, and it is a good thing to do away with.

I do not favor top limits for wages or salaries, but I have found that universal knowledge of top rates has helped me personally in dealing with personnel. Everybody knows the salary of the President of the United States, but who cares? I've had men complain to me that Tom Smith was making $50 more per month than the complainant. When I have explained that Tom Smith was more punctual, took less time off for sick leave, and really did creative work of a type that the complainant did not do, I've always been able to silence the complainer, if not satisfy him. At least I satisfied myself, and in some cases I accomplished some good.

It always seemed odd to me, but I have found very few men who have the least idea why some men are worth larger salaries than other men. The man who is always punctual at work, who puts his newspaper away immediately when the starting whistle blows, who takes a minimum amount of time off, who works steadily, who stays overtime when asked, without complaining, who learns to

"Chip started in here as just an ignorant kid and now he's middleaged."



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think creatively, who develops a sense of responsibility—in short, the man who respects his bread and butter, is the type of man I'll always fight for to get a higher salary or wage than his less earnest co-workers. Alas, today, under unionism, this is no longer possible with certain workers.

Unionism means regimentation, pure and simple, and I'm opposed to regimentation. Under unionism, the 3 or 4 good men out of 100 average men, are used to raise the wages of the 97 run-of-mine workers. I'll never see the justice of that, or believe in it. Oh, I know all the union arguments. "God made men that way, and that's the way it is. Every employer must be satisfied to take his share of top men, and accept his share of culls, too. It costs the poorly-prepared worker just as much to buy a pound of meat as it does the more skilled worker, etc., etc." That's unionism. I'm for unions, and I'm for a minimum wage, but I'm not ever accepting a system that stifles initiative and incentive, because the good man has to carry along the loafer, the shirker, the boozer, the guy with a big family and a craving for big pay, but with a soul that detests work.

Before regimentation by unions, the shirker knew what the top-skilled men were getting, and knew if he did likewise he could earn the same. At least he knew what he had to do to get ahead, if he wanted to get ahead. Today, he sits back and coasts, depending on the union to carry him.

It is admitted that, under unionism, the top-rated man cannot be compensated legally for his superior ability and initiative, unless all other men in his wage class are raised too, but I still think it is a good thing to make rates public property. Companies do try to rate men fairly, and the higher rates do occasionally act as a spur or incentive to lower-rated men, and I'm all for anything that tends to improve anybody's knowledge or skill.

James K Matter
Detroit, Mich

FROM THE HIGHEST salaried executives in our big corporations to the lowest paid wage earners, the stipend is usually kept secret as far as it is possible for this action, or lack of it, to occur.

Of course, there are some cases where braggadocios make their wages or salaries known, especially if there is an opportunity to lord it over another, and make the latter feel his neck before a crowd.

The Chinese are very frank about

these matters and openly tell their incomes to most anybody within hearing distance. The time was when these people wore hats with different colored knobs on their tops which indicated the financial standings of the wearers. Such, however, is far from the custom in the good old USA. To show more clearly what we mean:

A wealthy Chinese merchant and a railroad president sat next to each other at a large banquet, and, as usual under such conditions, they struck up a friendly conversation which gradually came around to the financial side of life. The Chinese merchant said to the president "Mr. ——, as president of such a long railroad system, you must draw a large salary; how much do you actually get for your services?"

The railroad magnate was embarrassed, colored to the roots of his hair, and then replied, "I get whatever the railroad board of directors see fit to award and pay me."

(That is one of the best examples of quick thinking ever brought to the attention of the writer.)

Foremen have occasionally very quietly told advanced apprentices that if they would take up certain work, the foreman would see to it that they were treated in the right way, and, sure enough the following week there was an additional amount in the pay envelope of each apprentice. But had this been made known, there would have been jealousies and bitter feelings among the men of all classes. This was a case where the foreman saw additional talent in a particular boy, and because of the greater wage the worker tried to exert his best efforts to make real progress. After a period of two months this boy told his foreman that he could easily work two machines simultaneously because he had studied the problem and had learned to do his work with the least effort.

Nobody knew what rate the boy received and the foreman said it was nobody's damned business.

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One thing to remember about Bunting Bronze Bearings is this – your design is not penalized by a standardization for some other industry. Some bearing types are standardized to suit one industry and force other industries into straight-jacket designs, but Bunting Bronze Bearings offer freedom and latitude for the design needs of every industry.

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the chuck that lives up to its name . . . SUPREME

The brass would never have discovered the talent which the boy possessed in a thousand years. The consequence was that the production in this particular department was increased and both the foreman and the boy received special acclamation.

In another case where a large plant operates, there are 48 classifications of machinists, and each classification has its own rate of wages. Nothing is left to the judgment of the foreman as to which is deserving and which is not. This ruling is not satisfactory, and the labor turnover is quite high. No pleas are allowed by a foreman to those higher up, and, as a consequence, at least one foreman quit, went with a competitor and eventually took several of the best men from his former department in the old place.

No absolute rule by efficiency engineers can be laid down whereby groups are to be governed like so many cattle that can be whipped around to suit otherwise minds—in many cases, those who may be far away in an organization of absentee ownership. It is believed by many that this type of ownership has been the reason for the formation of unions, strikes, and sit-downs.

We are supposed to be a nation of individualists and let us be—not a gang of snoopers into other people's business.

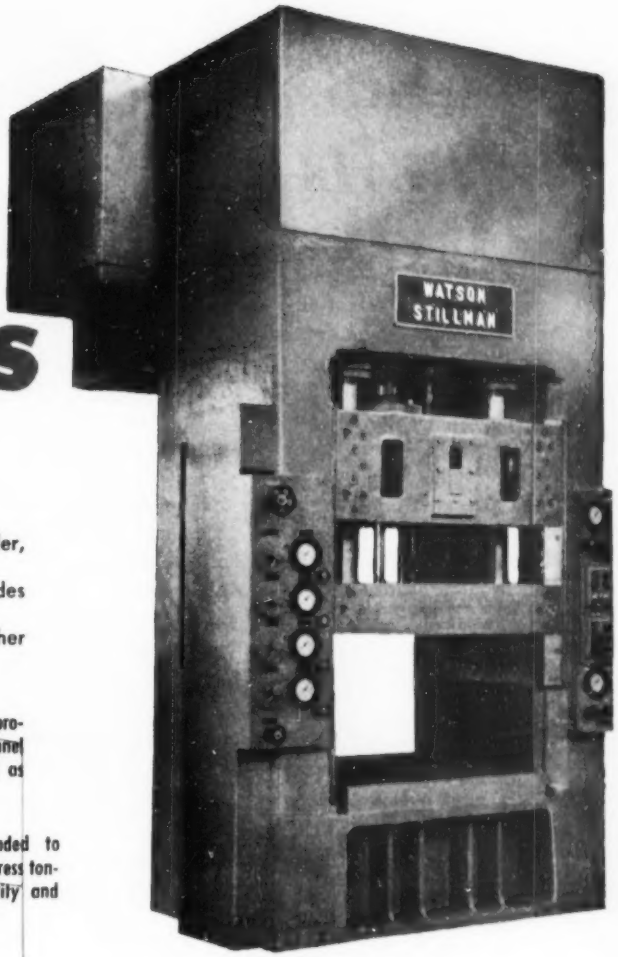
F H Stebbins
Worcester, NY

THE SUBJECT OF PAY adjustment has been a pain in the neck ever since man worked for wages, or salary. It is something to be classified in the category of the imponderables. No two men are equal in value and one of the most asinine habits we have allowed ourselves to get into is the one wherein we pay out a certain amount per hour for a certain type of work.

We could establish a rate of pay for a particular kind of work all right, but in order to be just to the workers we should augment that rate with an amount commensurate to the workman's value in skill, effort, and accomplishment. A man can possess the highest degree of skill yet wouldn't be worth a damn because of his lack of effort in putting out the work. A worker can rate high in effort, yet he has no unusual skill. He may possess both yet, in my mind, wouldn't be worth a tinker's damn on account of his disloyalty to his fellow workers by lack of harmonious cooperation.

The scheme advocated by our friend Al—that of rating the men according to classification, looks like the begin-

FOR YOUR HIGH-SPEED DRAW JOBS



These features tell the story —

- Adjustable Pressure and stroke on main ram, blankholder, and cushion.
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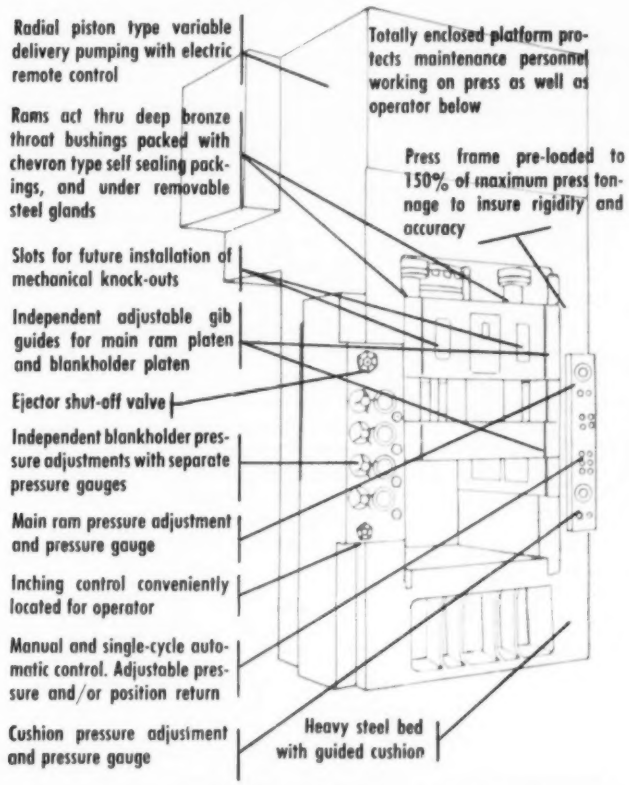
- Main platen and blankholder platen can be tied together for single action operation.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Rams act thru deep bronze throat bushings packed with chevron type self sealing packings, and under removable steel glands
Slots for future installation of mechanical knock-outs
Independent adjustable gib guides for main ram platen and blankholder platen
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Manual and single-cycle automatic control. Adjustable pressure and/or position return
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Totally enclosed platform protects maintenance personnel working on press as well as operator below
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Here is versatility, rugged, trouble-free construction, economy of operation and safety all in one press.

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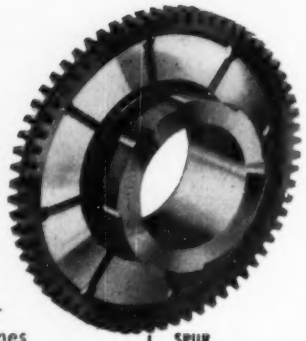

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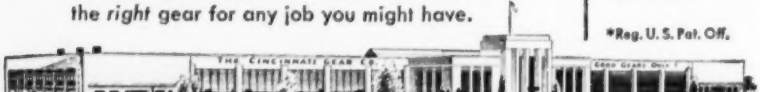

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"Looks like someone swiped another one of Pete's Columbia Molite Cutters!"

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ning of a justly compensating dawn whereby the value of a man stands out individually. It seems to me that workers should be classified as individuals and not as a mass of robots who, regardless of their skill, effort, and loyalty are tagged as workers of equal value.

Suppose we be conservative and classify four different workers. Number one is Harry Cawkins, a fast, dependable, accurate worker whose loyalty is beyond reproach. Cawkins puts the work out without wrecking tools or machinery. Now just take note of this man's qualifications. In addition to the aforesaid virtues, this chap has had lengthy experience gained throughout the years by traveling around various shops.

Bill Higgins follows in line as being a worker not quite up to Harry's standard. He is careful, accurate, and dependable, but is what one would term a slow worker because of his innate cautiousness. Bill lacks initiative and has contented himself with what he has learned in the shop of the moment. It wouldn't be fair to Harry to put Bill in the number one class because Harry can work rings around him. It may be that by perseverance and effort Bill will advance into the first category in a short period of time.

Now along comes Ben Gogetter, a likable chap who ploughs in with the ambition of a stud horse but in turning out his work he is inclined to be on the sloppy side; he lacks that degree of finesse so noticeable in the other two. Ben gets classified as a number three man.

Now we come to the number four gentleman whom we'll call George for convenience. George is slow and has to feel his way around rather cautiously. He will turn out a good piece of work now and then, while at other times he will not. His loyalty is sometimes doubtful as he is constantly on the gripe.

Now here we have, as far as we

"Can I borrow your . . ."
"NO!"

can determine, four men who have gained the fundamentals of their trade but through some freak of the human anatomy and the motivating force within them they are decidedly different. According to orthodox procedure they are of equal status and should receive the same rate of pay. It is readily seen that there is an injustice in such an arrangement. Management has established a rate of pay such as will assure the company at least an even break. In making such rates the valuable man, the Harry Cawkins—the number one man of the force—has to shoulder the burdens thrust upon him by carrying the load of the poorer workers.

I have always contended that if a man is worth $5.00 an hour he's going to make profits for the company by paying him what he is worth even though there is an orchestration of suffering from the less-able workers.

We haven't dwelt upon the worker who delights in getting what he can for as little work as he can do. Room isn't available in this magazine to give even a breathless resume of the famous timekiller who under present conditions commands the same rate of pay as the one who is conscientious on the job.

If the justice of the scheme is made known to the workers I don't see where there is any likelihood of complaint—that is, just complaint. Like the poor, we'll have the complainer with us no matter how squarely he is treated. They're born with a bellyache and no amount of ginger water will relieve them.

The virtue of the scheme of classification will be readily appreciated by the square-shooter as he knows that he has the opportunity to pick himself up. One can pick himself up by his bootstraps of effort and attention to business. If the worker knows that a certain classification means something definite, it is going to remove any desire to know what the rate of pay of his fellow workers is at the moment. The question may

"Flippen, there, sure lets everyone know when he gets a nice finish on a piece."

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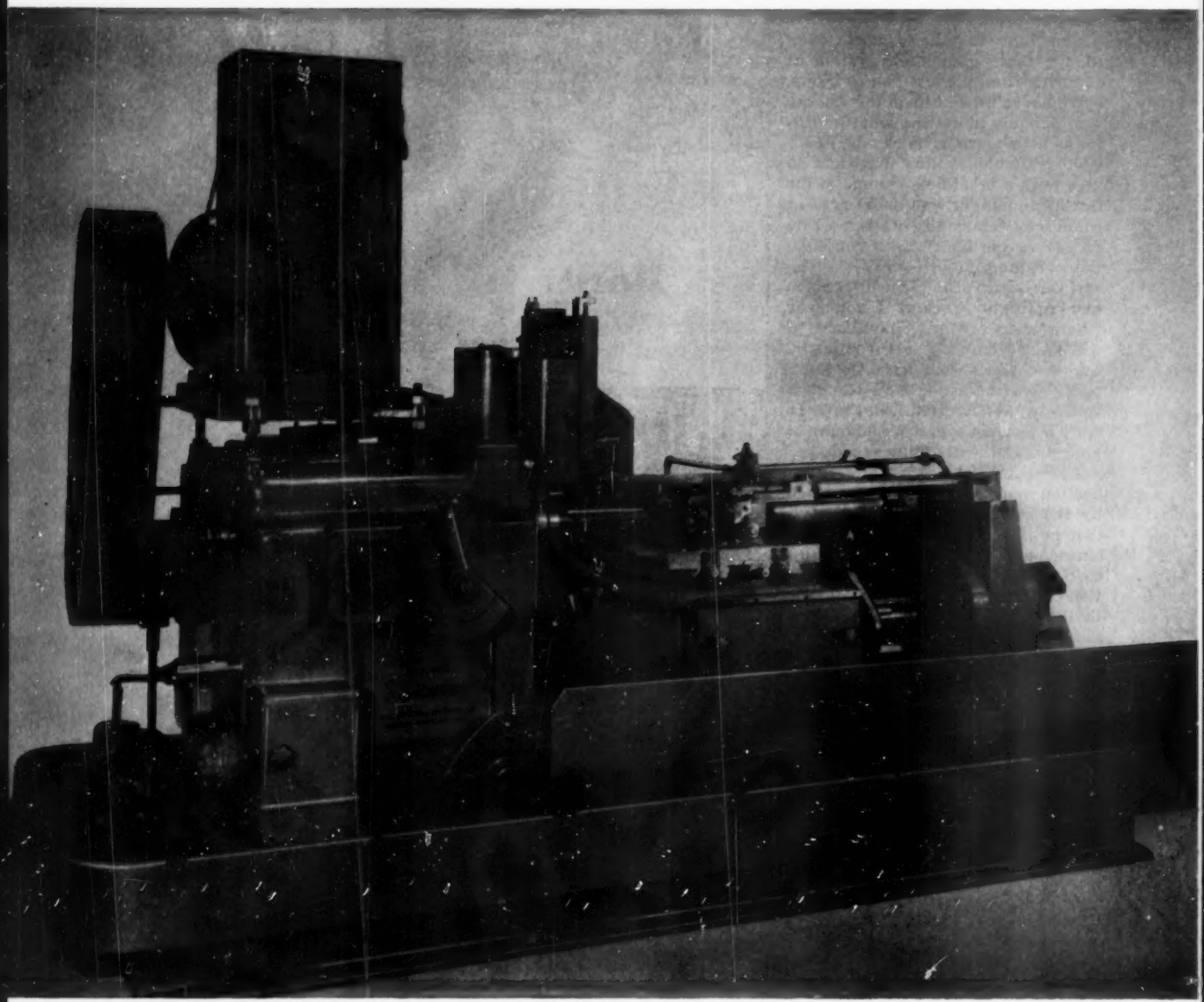
PRODUCTION SPEEDED ON DRIVE GEAR HUBS WITH MODEL "AR" AUTOMATIC *Lo-swing* LATHE



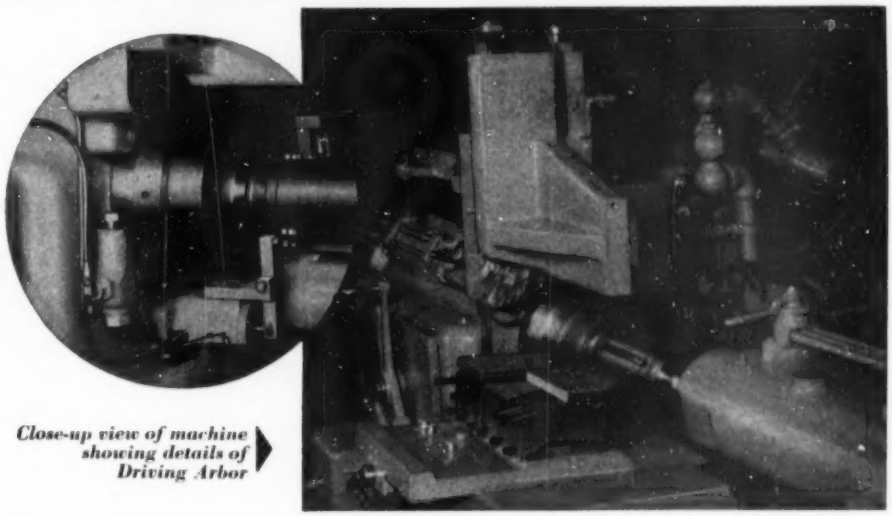
PRODUCTION COSTS

THE MONTH

* PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Model AR Lo-swing Automatic Lathe equipped with vertical slide

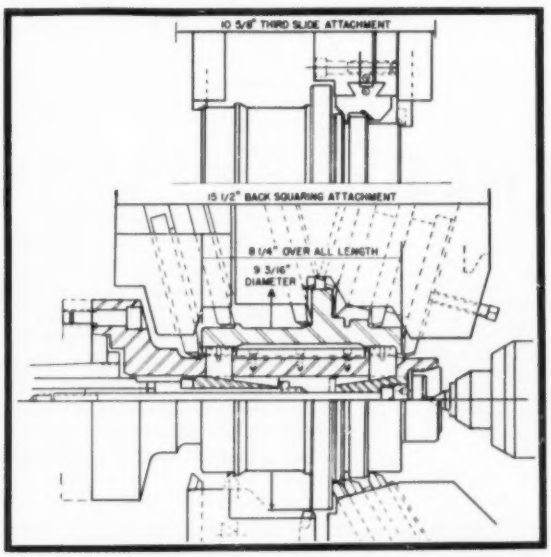
Close-up view showing Air-operated Locator



Close-up view of machine showing details of Driving Arbor

Problem: **To automatically turn, face and chamfer shoulders, and cut groove on Gear Hub with 9" Flange diameter, locating and centering from bottom of spline previously machined.**

Solution: **The Model "AR" Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools.**



The expanding, air-operated driver, shown in the line drawing and the above illustration, is fitted with two sets of six driving jaws which accurately center the part true with the bottom of the splines. The jaws are actuated with two independently-expanding bushings and pull bars which equalize the pressure on both sets of jaws. The parts are located longitudinally on the arbor by an automatic, air-operated locator, which moves forward to the exact locating position when the tailstock spindle is withdrawn and relieves when the spindle is advanced.

All diameters are turned with the tooling mounted on the front carriage slide. The squaring, chamfering and grooving operations are divided between the rear and vertical slides in order to simplify the tooling which is used for several different sizes of hubs. The line drawing shows the tooling in detail.

Consult our Engineering Department for Automatic Lo-swing Lathes engineered for your particular turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

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arise as to who is to decide what classification a worker is entitled to. Here is something that should be thought out by a committee of unbiased persons capable of arriving at a just decision.

There will be some people who will say that influences other than pertinent ones will enter into the rating of the worker. Great care and impartiality must be used in order that this scheme be successfully applied; any abuse, such as favoritism, fraternalism, or nepotism should be eschewed. Classification that means anything at all will classify strictly according to the worker's qualities and not according to any social connections he may happen to have. You'll find that when one worker receives a raise in pay, according to the customary proceedings as exists today in most shops, there is a gathering of the clan to resent it because they didn't get the same thing. Classification would avoid all this and do justice to all.

Jeff Gleason
Glendale, Calif

•

INDIAN GIVER

Should a foreman have the authority to arrange occasional special vacation schedules for the men under him, or is this the prerogative of the personnel department? Does the foreman or the front office know better as to when the work load will allow special treatment?

I KNOW WHAT Ed is up against; I have been in the same fix myself and you can be assured that I was hot under the collar for being let down by the head mogul.

It has always been my contention that when a foreman made a promise to his men, it should be kept. When a higher-up vetoes that promise it does not conform to good management caliber.

The foreman's word should be respected by those above him and he should command their cooperation. If there is one thing that will break down the morale of a shop it is to have another person in higher authority show the foreman up by making it known that his promises amount to nothing. The worker usually has a certain respect for his department head and anything that is done by the administration to interfere is certain to result in tearing down all that the executive had done to build it up. If a foreman is given charge of a department he should certainly have enough good judgment to know when a man can be spared to indulge in a seasonal pastime. To humiliate a man by countermanding an arrangement made by

him to one or more of his subordinates reflects a smallness of character not often found, thank goodness, in men in high positions.

It is not a bad idea for the personnel department to give permission for unusual periods of absence, but let this happen after the staff has been duly notified so as not to create any embarrassing situations as was the case with Tom and Dick. Promiscuous absence can wreck the smooth-running machine of production and the granting of such should be handled with wise forethought to this end. For a man to take the attitude that it is no skin off and so forth because he is taking the time off of his vacation time only denotes that he doesn't consider the necessity of uninterrupted production. I can't see where Ed is being relieved of a lot of trouble when the act of a higher-up made him look like a chump with no mind of his own. Who is better qualified to regulate the flow of work through the department than the foreman?

Frank Van Horn
Auburn, Calif

MAKING THE FOREMAN get written permission from the personnel department for any unusual vacation time for his men is an example of regimentation that will hinder him in the proper administration of his job. A foreman should not be burdened with the unnecessary short-circuiting of his authority in requiring him to get higher approval for bona fide time off for his men. The foreman was chosen for his position because he demonstrated that he possessed the skill and leadership ability necessary to direct the application of labor and equipment to getting out specific work. But the inept demonstration of wrongly applied authority by the front-office via "Indian Giver" tactics just rubs it into the foremen that the boss hasn't enough confidence in his foremen to abide by their decisions in arranging the work schedules and handling the personnel situations in their group.

In the case under discussion, the men involved in the split-vacation arrangement had earned the time off. They were entitled to a two week regular summer vacation according to company regulations, but had it all arranged with the foreman to give up a week of the regular summer vacation time to make up for the hunting trip at the start of the hunting season. They had worked hard to get the jobs out, pitched in on the tough jobs when asked to do so, and looked forward to the planned early

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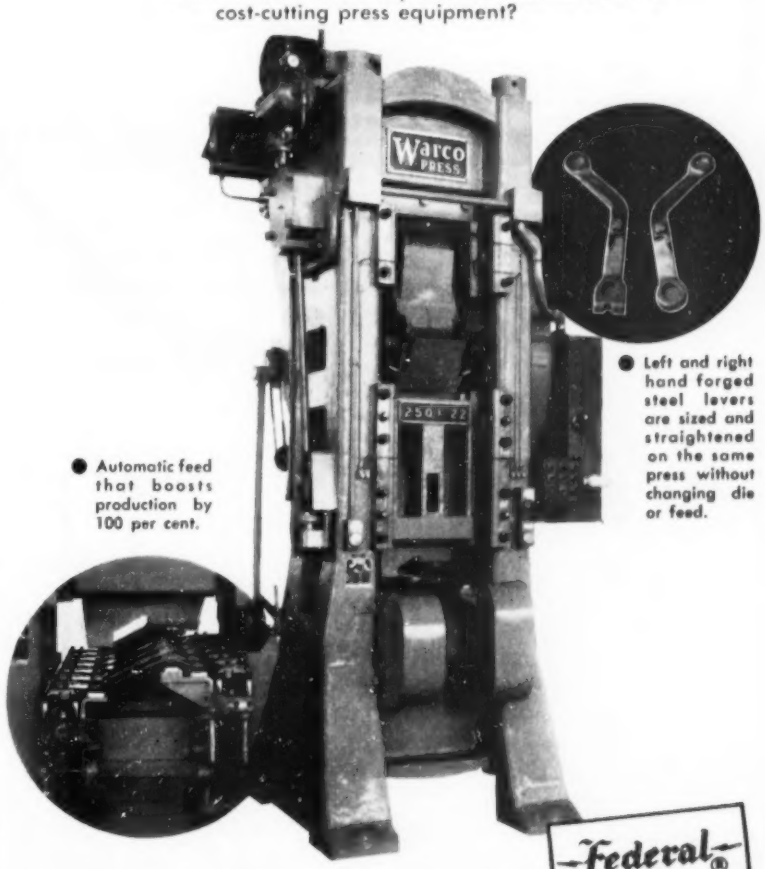
When a leading automobile manufacturer wanted to cut production costs on a forged steel lever Warco engineers worked with them in designing and building a 250-ton coining press with a chain type feed to automatically size and straighten the levers at a speed of 30 finished pieces per minute.

Front loaded, the press will size and straighten either left or right hand lever without change in dies or feed. It has reduced the production time of this part by more than one-half and has provided a safer, less fatiguing job for the operator.

Warco is constantly working out faster, less expensive and safer press production methods. Why not call them in the next time you are in the market for cost-cutting press equipment?



● Left and right hand forged steel levers are sized and straightened on the same press without changing die or feed.

● Automatic feed that boosts production by 100 per cent.

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THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Warco PRESSES®

VINCO helped take the "guess" out of involute spline manufacturing and gaging for INTERNATIONAL HARVESTER

Mr. Leon N. DeVos
Vinco Corporation
9111 Schaefer Highway
Detroit 28, Michigan

Dear Mr. DeVos:

Since early 1950 you and other members of the Vinco Corporation have been working closely with representatives of our Company in solving the many complex problems involved in the design, manufacture, and inspection of involute splines. During that time you and your associates have been extremely helpful to us in taking the "guess" out of involute spline manufacturing and gaging.

Because such conferences with you have been so productive, meetings of this kind are now a "must" in our farm tractor manufacturing operations. Subsequent discussions have been most helpful in establishing designs and gages for our transmission shafts and gears.

We wish to take this opportunity to thank the Vinco Corporation for the fine cooperation it has extended to our Company. This is just another example of how companies such as International Harvester and its suppliers can, by working together, produce better products for a better America.

Sincerely,

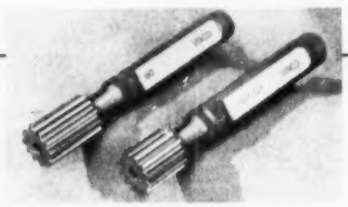
Eric A. Wolfram

Eric A. Wolfram

VINCO CAN DO THE SAME FOR YOU

So if your next production program involves splines, call in a Vinco field engineer. He will save you both time and money.

VINCO CORPORATION
9125 Schaefer Hwy., Detroit 28, Mich.



VINCO, the country's largest spline gage manufacturer, produces all types of involute, serration and straight sided spline plug and ring gages.

VINCO
MILLIONTHS OF AN INCH FOR SALE

THE TRADEMARK OF DEPENDABILITY

hunting trip. What's the difference if workers take their vacations in one lump period during the summer or break it up as split vacations during the year? As long as the arrangement does not interfere with work schedules (and the foreman knows best on that score) there will be no loss to the company. It certainly makes a foreman feel small, and perhaps wonder if he is back in school again, to be treated like a kid by the boss. It's no joke being called on the carpet and asked by the boss by what authority he granted two men time off to go hunting, without prior specific permission being obtained from the boss before the foreman granted the week's special vacation. Where the granting of time off had always been left to the discretion of the foreman, without the necessity of bothering the boss about that detail, it certainly makes the foreman feel that he displayed bad judgment to have the boss reverse the foreman's decision and start a precedent of making it mandatory for him to obtain written permission from the personnel department for any unusual vacation time.

If the mission of the personnel department is to take work off the shoulders of the foremen, then the foremen's point of view as to what constitutes interference with his authorized responsibilities should have been taken into consideration before the order was issued delegating time off authority to the personnel department. In this circumstance the personnel department is actually burdening the foreman with more work by making it necessary for him to obtain permission in matters involving the administration of his own department.

Of course there are some foremen who welcome any effort by the per-

Remember the guy that told the old man: "Why don't you get away from here, so we can get some work done?" . . . You thought he was the bravest guy in the world!

DOUBLE CIRCLE TOOLS

HAVE BOTH

endurance

AND

accuracy

It takes both to produce quality tools . . . for each is dependent upon the other to give trouble free performance.

CHICAGO-LATROBE makes sure that the complete line of Double Circle Tools has both *endurance* and *accuracy*. It is a result of high quality CHICAGO-LATROBE standards . . . with each manufacturing step carefully checked . . . and the finished product scientifically inspected by experienced craftsmen to insure *precision* tools.

To back up CHICAGO-LATROBE'S determination of maintaining its enviable reputation for leading quality, every fifth employee is a qualified inspector. No finished tool can escape these skilled inspectors without having the qualities of both *endurance* and *accuracy*.

To insure low yearly tool costs it will pay you to specify DOUBLE CIRCLE TOOLS.

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IF
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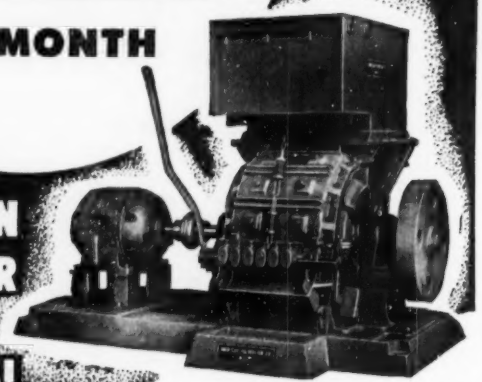
AMOUNT TO
10 TONS OR MORE
PER MONTH

AN AMERICAN
METAL TURNINGS CRUSHER
can bring you
NEW PROFITS!



AMERICAN #2400
METAL TURNINGS CRUSHER

A chip salvage system, with an American Metal Turnings Crusher at the core, can help you realize new savings and profits in metal, oil, man-hours, factory space, and tool maintenance. Consider these typical money-saving, money-making advantages of an American installation:

(1) **Brings $3 to $4 more per ton for chips** than for long machine shop turnings,

(2) **Reclaims 30 to 50 gallons of cutting oil per ton,**

(3) **Prolongs tool life** through more liberal use of recovered oil,

(4) **Saves 75% storage space . . .** permits heavier freight car loads . . . cuts shippig costs,

(5) **Easier, faster handling,**

(6) **Easier briquetting,** so essential for foundry and steel mill use.

THIS COULD BE YOUR PROFIT STORY FOR THE NEXT YEAR!

240 Tons Metal Turnings Per Year.....$ 960.00 Per Year
(20 tons per month at $4 extra per ton)

3600 Gallons Cutting Oil Recovery at 30¢ Per Gallon.....$1,080.00 Per Year
(30 gallons per ton x 240 tons=7200 gallons.
Half of this, 3600 gallons, can be credited to use
of chips instead of long turnings.)

Estimated Savings on Manpower, Storage, Tool Maintenance, Freight, etc......$ 300.00 Per Year

TOTAL GROSS PROFIT
(Resulting from an American Installation).....$2,340.00 Per Year

WRITE for American Rolling Ring Metal Turnings Crusher Bulletin.

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers

1523 MACKLIND AVE.
ST. LOUIS 10, MO.

sonnel department in allegedly lightening their burdens. They argue that the foreman is being relieved of a lot of trouble and responsibility in setting vacation schedules by having the department handle such matters. They claim that it shouldn't be up to the foremen to have to work out special vacations and time off for their men. Having the personnel department do this so-called dirty work will relieve the foremen from worrying about pleasing every Tom, Dick and Harry in his group who wants to take advantage of split vacations or other time off variations. Their line of reasoning is that it might be a good thing if a worker has to get written permission from the personnel department for being away from work, even if it is taken as part of his regular vacation time. The worker might think twice before undertaking time off that might disrupt work schedules. Why permit deviations from regular vacation schedules which have been set up at time fixed so that minimum disruption of work is assured? Maybe it is better if the front office through the personnel department decides when the work load will allow special treatment. After all, the top side and personnel men have a better idea of how the work load will fall, and they can tell better when it is a good time to allow special leave privileges. It might teach the men that their jobs come ahead o' hunting trips.

In my opinion, this is erroneous reasoning. The foreman being closest to the work and the workers knows best whether the requested special vacation time will interfere with work schedules. It will help assure good personnel relations and contented workers when the foreman is able to work out special vacations and time off with his men. It will make them better workers because they will realize that the man they are

"Be careful there, Boss, I think it's . . . yep, it's slinging oil."

working for is interested in them and their problems.

When the boss gave the foreman the authority to make decisions affecting the workers' operation on the job, he made it clear that the foreman didn't have to check with him all the time. Now the boss has by-passed the foreman in delegation of authority over his men. In the future, how is the foreman going to hold the respect of his men when they know that his decisions are set aside by higher authority? It is small wonder that many foremen feel that there has been a general trend to whittle down the foreman's authority and responsibilities. First, the right to hire and fire was taken away from him. Then he was restricted in his authority to settle grievances which arose in his department. Safety enforcement was turned over to the safety department or a safety supervisor. Now the foreman can't even make a decision respecting his workers' vacations. A foreman would be inhuman indeed, if he did not resent this development. He feels that his boss is really implying that he has had to narrow the area of the foreman's authority because the foreman has been unable to cope with the labor problems involved in his group.

However, in some plants, foremen to a certain extent have demonstrated this inability to cope with labor problems. But most management men are admitting that narrowing down of a foreman's responsibilities is the result of poor foremen-selection to begin with, and wholly inadequate training of foremen for the job. Today the proper selection and training of foremen is assuring the development of responsible leaders. Today there is also a general acceptance of the importance of strengthening the foreman by placing responsibility for personnel squarely on his shoulders, but with the help and cooperation of the personnel department.

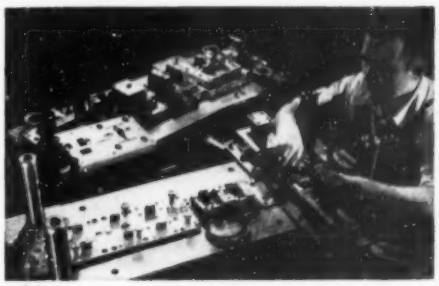
In the interest of good management, a foreman's authority should be definite and understood by both top side and foreman. Both foremen and workers know where they stand and act accordingly when authority is fixed. When a man has responsibilities without authority, those who work for him and with him usually attempt to see how much they can get away with.

In the case under discussion, the boss has indicated that he doesn't respect the foreman's discretion and judgment. The foreman, in the matter of the split-vacation arrangement that he made with the men involved,

B. Jahn Production Proved Dies!

Top flight engineers specify "B. Jahn Dies" as a shortcut from drawing board to delivery date. The design and craftsmanship embodied in every B. Jahn Production Proved Die eliminates all guesswork, all trial and error — guarantees flawless die performance . . . die economy . . . die quality!

Thorough inspection of this 10 station progressive die for producing clips to link 60 caliber machine gun shells insures minimum time from production line to battle line. PRODUCTION PROVING from 10 to 50,000 pieces from the die guarantees "proving ground" quality like this —



1. B. Jahn recommends the *right* tools and dies for each specific requirement.
2. Progressive dies — single dies — tools for multiple slide machine or dial press use — are recommended only when substantial production savings can be realized.
3. B. Jahn dies are designed in sections for ease and economy of repair whenever advisable.
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5. B Jahn dies are ground all over after hardening, upon request, for outstanding performance and economy

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OK MILLING CUTTERS IN THE AIRCRAFT INDUSTRY—NO. 7

OK carbide cutter facemills push-rod faces of cylinder hea for world's most powerful piston aircraft engine

OK CARBIDE CUTTER, ON CINCINNATI VERTICAL FINISH-MILLS RIGHT ANGLES OF INTAKE AND EXHAUST PUSH ROD FACES, OF PRATT & WHITNEY AIRCRAFT WASP MAJOR ENGINE CLIMB-MILLING ONE AND CONVENTIONAL-MILLING THE OTHER

THE close tolerances specified by the aircraft industry are a challenge to the "world's most modern milling cutters" and the "world's most modern milling machines."

The picture shows one of thousands of milling machine operations. Note the tilting fixture which makes possible face and periphery milling, of both sides of the cylinder head.

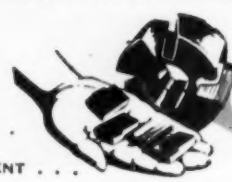
OK carbide milling cutters are widely used in the aircraft industry because they have the necessary stamina . . . *more beef* in the body, pack *more blades* for finishing cuts, *heavier blades for roughing* cuts. They put more finished pieces on the floor, day after day.

Blades are simple wedge-shaped blocks. (The wedge is world's strongest mechanical device). Blades once set, cannot move. Mated serrations prevent tipping and slipping, provide a scale for blade advancement to compensate for wear, reduce grinding to less than .005" per blade on cutters in which the fine adjustment feature is incorporated. No locks, blocks, screws, pins or gibs are needed.

Write for OK Tool Catalogs

"MODERN MILLING CUTTERS FOR MODERN MILLING MACHINES"
"AMERICA'S FIRST SYSTEM OF SINGLE POINT TOOLS"

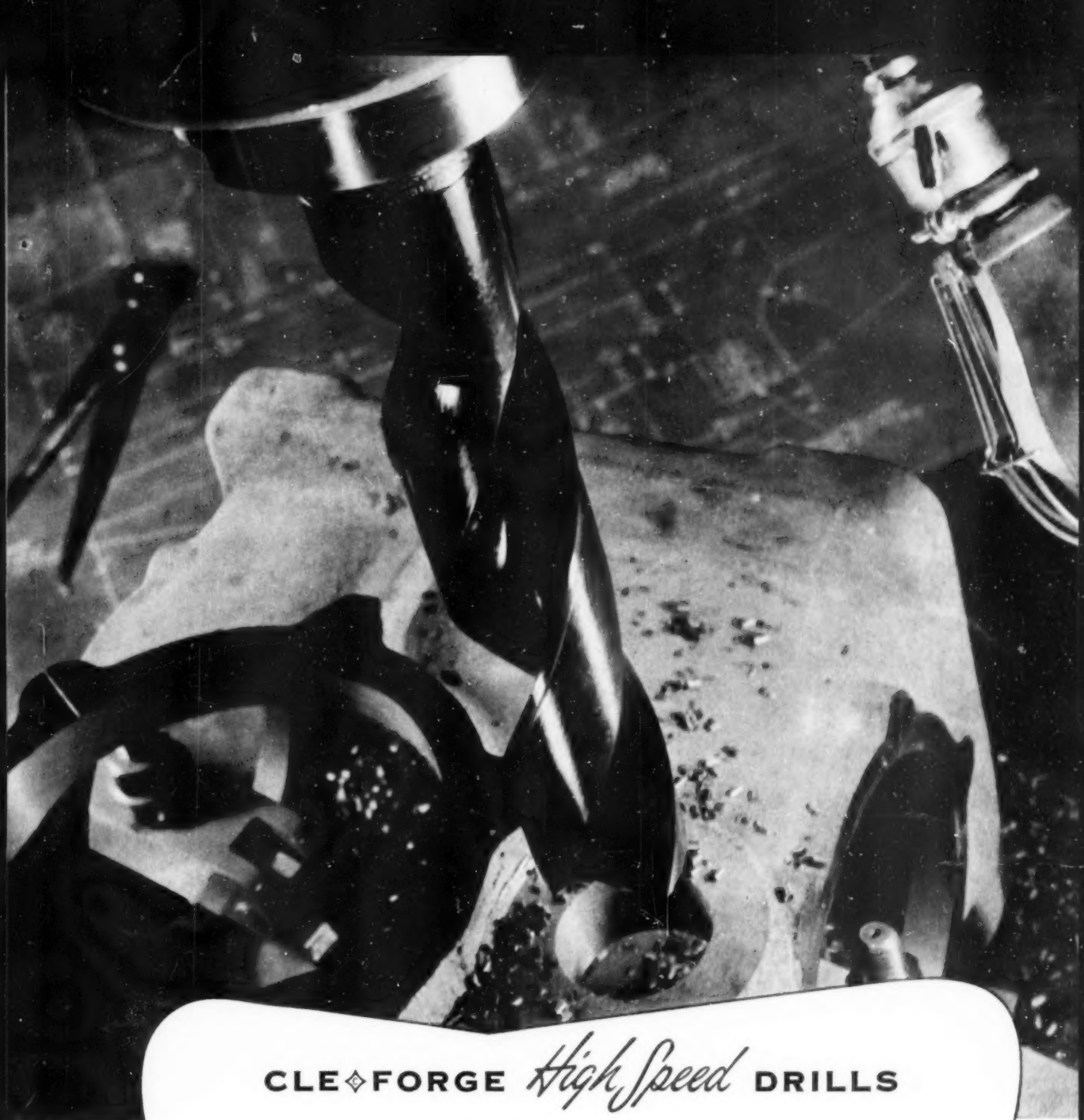
TWO COMPONENTS—
BODY AND BLADES
SIMPLE . . .
STRONG . . .
SUFFICIENT . . .



OK

modern milling cutters for modern milling machines

THE OK TOOL COMPANY, INC., Milford, New Hampshire



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Give More Holes Per Grind

On every job — no matter how difficult it may be — you'll appreciate the *extra* quality in these famous drills. They produce better work faster, at lower cost. No other drill gives you such outstanding *performance* and *economy.*

THE **CLEVELAND** TWIST DRILL CO.

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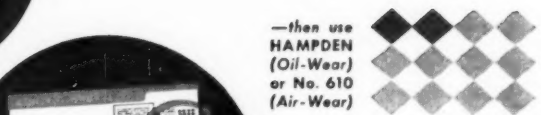
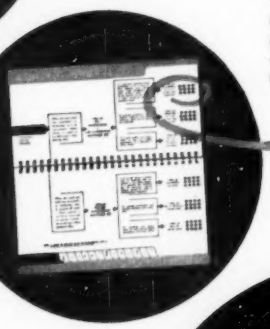
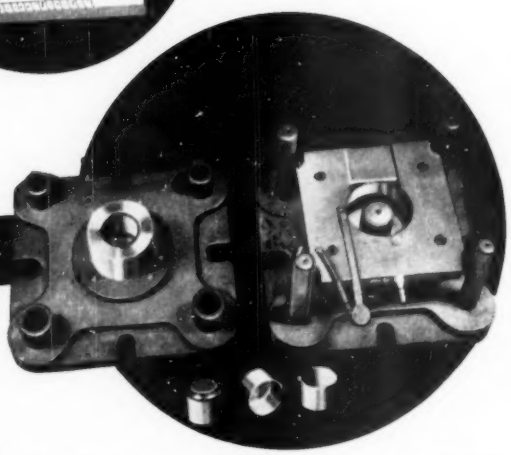
How ONE TOOLMAKER . . .

USED THIS GUIDE . . . . . —then use HAMPDEN (Oil-Wear) or No. 610 (Air-Wear)





TO HOLD DOWN UNIT COSTS . . .



AT which step in your tooling process would you welcome real help in reducing tool and die costs? Tool Steel Selection? Heat Treating?—or on-the-job "Trouble-Shooting"? Here's how you, like the maker of the Dies shown here, can start to reduce costs with a Method that helps you at *all 3* steps.

First, to simplify selection, use the handy Selector Section in the Carpenter Matched Tool Steel Manual. Quickly and surely, it enables you to put your finger on the proper steel for best results. Next, to further insure tool and die performance, use the Manual's complete heat treating instructions—they have been simplified beyond anything previously known. It's easy to get started—use the Carpenter Matched Set Method to help you "trouble-shoot" your present tool and die jobs.

For better, lower-cost tooling, put this practical, easy-to-use Method to work, now. Ask for the 189-page Carpenter Matched Tool Steel Manual—just see your Carpenter representative. The Carpenter Steel Company, 109 W. Bern Street, Reading, Pa.

Job:
Compound Blank and Draw Die for forming .031", ¼-hard brass Vent Valve Bodies at the rate of 103 per minute on a punch press.

Problem:
Unit costs were on the upswing because the old dies wore too rapidly, causing frequent and costly machine shutdowns for regrinding.

Solution:
Looking for a die steel with maximum wear resistance, the toolmaker referred to the Selector Section in the Carpenter Matched Tool Steel Manual, and quickly arrived at Carpenter *Hampden* (Oil-Wear).

Heat Treatment:
Simplified instructions in the Manual were followed.

Results:
2 hours of costly machine downtime were eliminated *each day*—production per grind *rose over 300%!* As a matter of interest, the toolmaker takes off approximately .0005" per stoning and gets about 100 grinds from the Blank and Draw Die.

IMMEDIATE DELIVERY FROM LOCAL STOCKS!

Call Your Nearest Carpenter Warehouse or Distributor

Carpenter STEEL

Matched Tool and Die Steels

Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Mill-Branch Warehouses and Distributors in Principal Cities Throughout the U. S. A. and Canada

was guided by past experience in letting the men off. The foreman had probably found that the split-vacation arrangement worked well in previous years in meeting emergency jobs during the regular summer vacation months by having experienced men available. Permitting an employee to take his vacation at different times during the year instead of one fixed period has the advantage of reducing the disorganization that frequently results from regular vacation procedure.

If the foreman is expected to believe he is on the management team, he should have real authority to carry out plans as he feels they should be handled without going to the man over him. He should be able to make final decisions as long as he is fair to his men and to the company. Unnecessary personnel handling directives from the top side mean too many hands in the foreman-worker relationship pie.

Of course it isn't always possible for management to give a foreman all the decision-making leeway that's ideally desirable. The boss might have other reasons for his decisions that the foreman may not be aware of. However, good management demands that the boss let every foreman know why he has to impose certain limitations on his authority. He also makes certain that the foreman is at least consulted on all matters affecting him in his relations with his workers, and he takes the foreman's opinions seriously.

The status of good foremanship demands that the job of foreman be made important and attractive to men of managerial ability. The foreman is the "boss" to the workers; the top side should not confuse them with orders from another source. He is the first point of management contact and makes the first management decisions on all matters relating to

"When a chill goes up his spine, he rejects for improper surface finish."

WHAT'S THE BEST WAY TO APPLY ZINC PHOSPHATE COATINGS TO STEEL?

OAKITE CRYSCOAT HC DOES A FINE JOB FOR US*

*This comment came from a Pennsylvania munitions maker, who added that Oakite CrysCoat HC has put an excellent zinc phosphate coating on 385,000 shells with "absolutely no trouble... maintenance and control are very easy."

The Oakite CrysCoat HC coating on steel products—such as artillery shells, rocket fins, auto parts, etc.—weighs more than 200 milligrams per square foot. It more than meets the requirements of U.S. Government Specifications:

JAN-C-490, Grade 1 **57-O-2C, Type 2, Class C**
PA-PD-191, Rev. A

The Oakite CrysCoat HC Process for preparing steel for painting—either in spray-washing machines or in tanks—has five big advantages:

1 The heavy CrysCoat HC coating forms a strong foundation for the lasting adhesion of paint. *See page 5 in free booklet.*

2 The heavy coating gives excellent protection against electrochemical corrosion. *See page 7.*

3 The CrysCoat HC Process is easy to control. Only one material is used for make-up and up-keep. No accelerators, starters, toners or other additives are needed. Only one simple type of titration is used. *See page 9.*

4 The CrysCoat HC reaction produces relatively little sludge and scale. *See page 10.*

5 Stainless steel is not necessary for all parts of the equipment. *See page 11.*

FREE For complete information, mail the coupon for a copy of our 12-page illustrated booklet describing the Oakite CrysCoat HC Process.

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MATERIALS • METHODS • SERVICE

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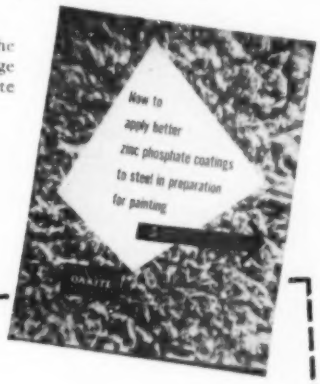

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24 Rector St., New York 6, N. Y.

Send me a FREE copy of "*How to apply better zinc phosphate coatings to steel in preparation for painting.*"

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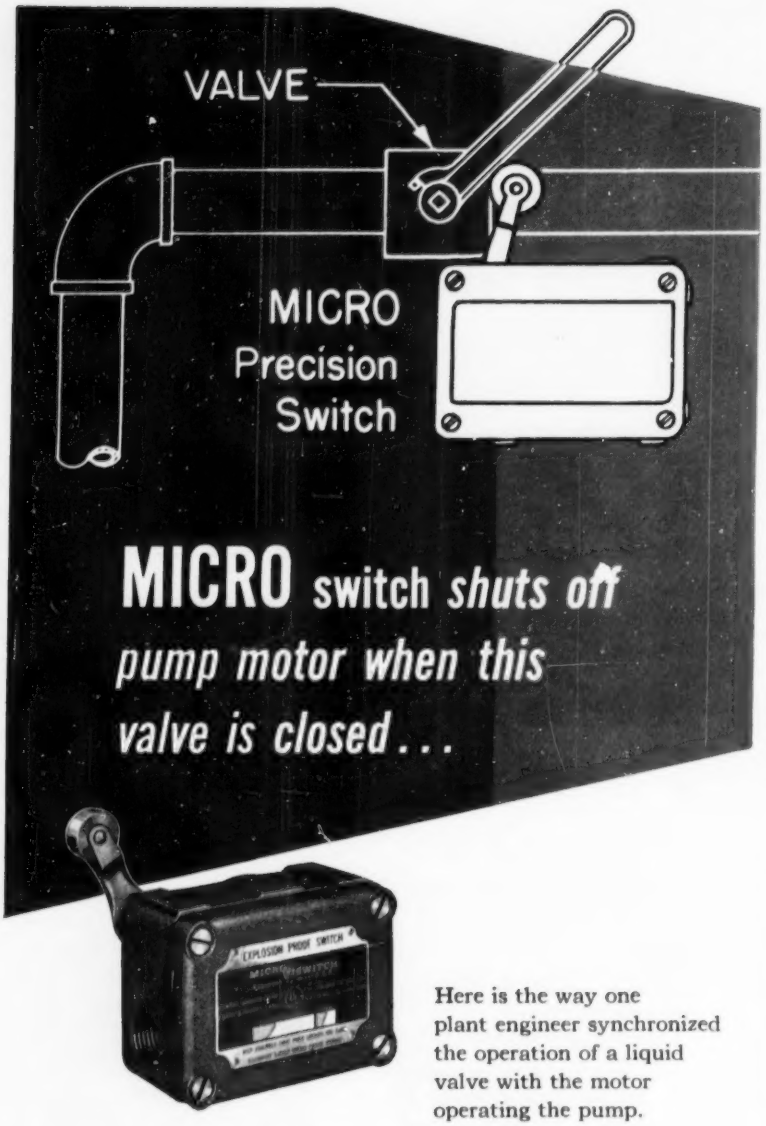
At the Metal Show — Visit Oakite Booth 2573



Here is the way one plant engineer synchronized the operation of a liquid valve with the motor operating the pump.

He installed a MICRO switch with a roller arm actuator so that opening of the valve handle automatically operates the switch and closes the motor circuit. Closing the valve shuts off the pump motor. "By using this switch with its adjustable lever arm we have a freely adjustable feature not heretofore attainable with any other switch," he says.

Keep up to date on hundreds of other live, practical ideas by reading MICRO Tips. This MICRO publication is full of specific ways plant engineers have made their present equipment safer, more efficient and more productive by installing MICRO switches. Just tell your MICRO distributor you would like to receive MICRO Tips regularly.

MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

the employees under his supervision. The foreman has a right to expect from top management that he receive support for his decisions, be notified well in advance before a policy is put into effect, be made answerable to as few men with authority over him as possible, receive clear-cut instructions, and no buck-passing. Then he can furnish top management with loyalty and intelligence in the performance of his duties, be responsible for the quality of work, production and costs, build morale and maintain satisfactory human relations with workers.

When one person is in charge of a group there are no conflicts of opinion or authority. When those on top are "Indian Givers" in delegation of authority they cannot expect to hold their subordinates responsible for the work of those under them.

Every good foreman knows that within the framework of the organization of his company he must administer and respect the policies of his supervisor—the superintendent. The superintendent is responsible for over-all planning for the entire department, the meeting of work schedule dates of all the foremen in the department, and has the over-all responsibility for the supervision of personnel in his department. Foremen must follow and work within the lines of delegated authority stemming from the top. They should understand and respect the responsibilities of their department superintendent. But the wise superintendent should make certain that there should be no dual authority as far as his foremen are concerned. The superintendent and top management should see to it that the foreman has the responsibility and that his authority is not hamstrung. Having proper responsibility for operating his particular department and being given full authority over his men will permit the foreman to steer a straight course between management's and workers' interests. Hamstrung authority implies a lack of sympathy by management for good foremanship. The superintendent, under the concept of organization and management functions should operate at the level of over-all planning and delegate responsibilities and corresponding authority to his foremen who are held accountable for the successful operation of their particular shops. He should not give and then arbitrarily nullify delegated authority without cause.

Initiative along the particular line in which he is engaged must be left each foreman, in order that he may take pride in the accomplishmen.

HERE'S A CLUTCH

THAT'S WORTH LOOKING INTO...

THE CLEVELAND DRUM TYPE Friction Clutch

● Take a good look at the patented Cleveland Clutch shown here. If your press production is handicapped by frequent clutch failure, this efficient unit will quickly improve performance and reduce operating costs.

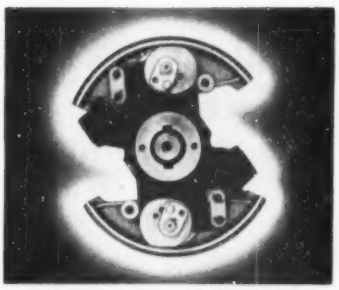
You can see that it's designed with a minimum number of parts. That means less weight, fewer adjustments, less chance of failure. This light-weight construction assures savings in horsepower required for operation.

Note that the air-operated Clutch and spring-loaded Brake are combined as a unit of one-piece construction. They cannot become separated nor can they be engaged simultaneously. There can be no costly "brake drag". With the Cleveland Clutch you always have FULL Clutch or FULL Brake. That means quicker starting and stopping, and complete control at all times.

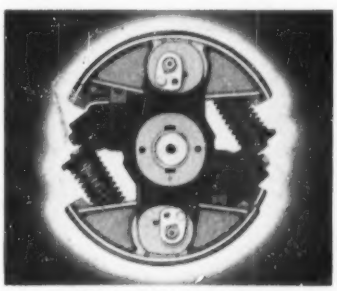
Two important safety features should be noted. The positive, spring-loaded brake stops the slide immediately in event of electric or air supply failure. To prevent possible die dar age, the clutch can be set to slip under overload.

If you are interested in the savings obtainable through more economical power press performance, let us furnish you with complete details on suitable Cleveland Presses equipped with air operated Cleveland Drum Type Friction Clutches. Write or call today!

A-R168



CLUTCH SECTION WITH BRAKE SHOES REMOVED



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THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

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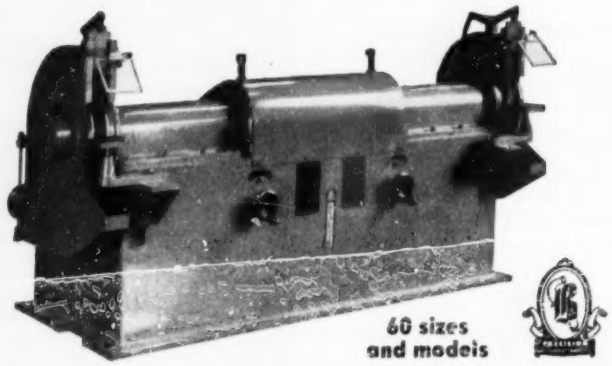
"All I said was our costs had gone down now that we are using Columbia EXTRA tool steel."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels—High Speed Steels
Die Steels—Hot Work and Shock Resisting Steels
Carbon Tool Steels.

TOOL COLUMBIA STEELS

SMOOTH OUT YOUR ROUGH GRINDING OPERATIONS WITH THIS NEW BRADFORD DOUBLE-END SNAGGING GRINDER



60 sizes and models

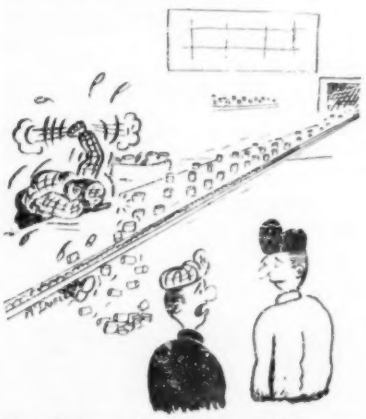
Heavy-duty 20 h.p. model illustrated. Double-end grinder has individual, infinitely variable speed drive. Use both wheels simultaneously or individually, at same or different speeds. Equipped with adjustable tool rests; safety eye shields; compensating mechanism to allow for wheel wear; many other features. Fully safety engineered. Write for complete details and specifications.

THE BRADFORD MACHINE TOOL COMPANY
664 EVANS STREET, CINCINNATI, OHIO

of his work. A long train of conditions inimical to successful operation will be started if initiative be denied foremen. It will ordinarily result in the development of organization cogs who may be mechanically excellent in performing daily duties, but totally unfit to meet emergencies. The final result is that confidence in the business is lost by those on whom its success largely depends; the foremen in direct charge of operations. By following through on designation of authority, orderliness will be achieved. It should be remembered that the man who never amounts to much is the one who can do nothing else but what he is told.

In order to avoid conflict of functions of the personnel department and foremen, the top side should establish in writing a definite list of the functions of the personnel department, itemized as to individual tasks involved. These functions should be studied and determination should be made by the top-side management whether they conflict with personnel functions of the foremen. In order to decide whether the personnel department can perform certain functions better and more economically than the foremen, conferences should be held by the personnel department and the supervisors, including foremen, to get both viewpoints and advice as to how personnel can best serve the foremen and make less work for them. This is the soundest method for resolving conflicts in authority and responsibility involving personnel functions of the foremen and the personnel department.

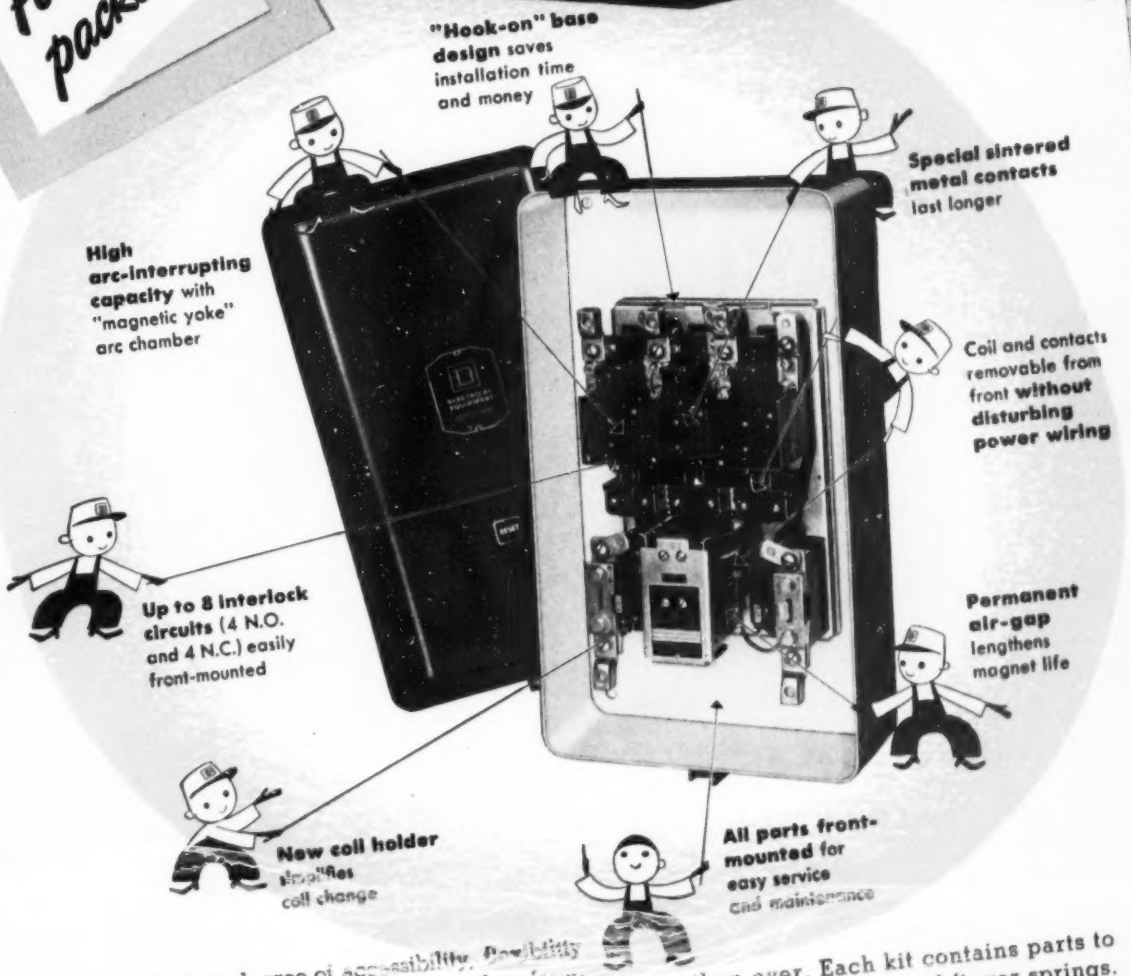
The practice of showing authority merely for authority's sake always hurts rather than helps. The boss is just throwing his weight around by issuing the new vacation order. Managers of men should remember that



"I don't know, all I said was, 'What's new, Pete?' "

NEW Square D Size 4 Starter

Feature-packed!


"Hook-on" base design saves installation time and money
Special sintered metal contacts last longer
High arc-interrupting capacity with "magnetic yoke" arc chamber
Coil and contacts removable from front without disturbing power wiring
Up to 8 interlock circuits (4 N.O. and 4 N.C.) easily front-mounted
Permanent air-gap lengthens magnet life
New coil holder simplifies coil change
All parts front-mounted for easy service and maintenance

The highest degree of accessibility, flexibility and compactness—with no sacrifice of performance and long life. That's Square D balanced design—and you'll find it in every size Square D starter.

"Off-the-Shelf" Parts Kits, another Square D convenience feature, make normal maintenance easier than ever. Each kit contains parts to replace all load contacts and finger springs. Electrical interlocks also available in kit form.

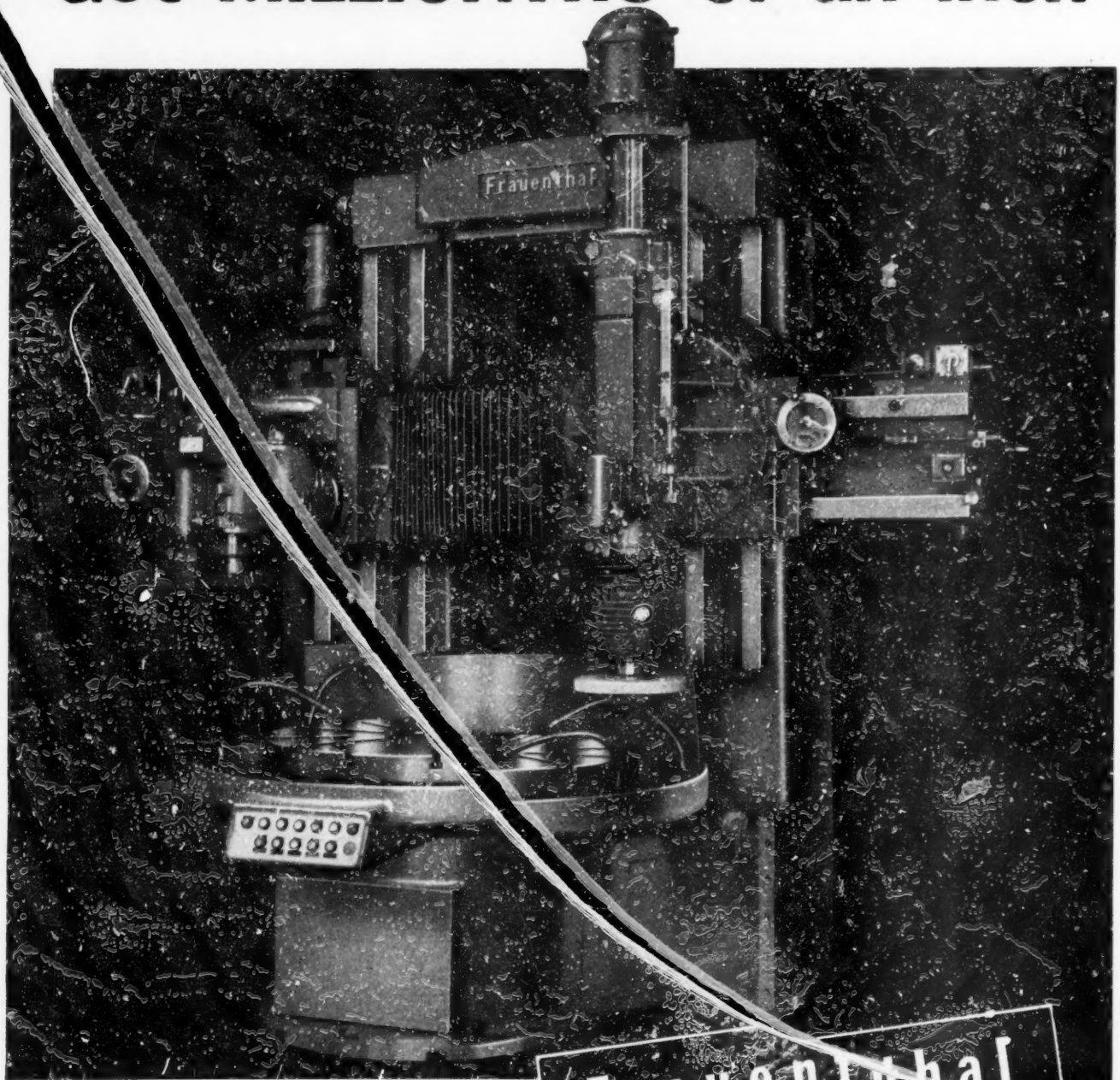
Write for Bulletin 8536, Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Get MILLIONTHS of an inch



This 1800 Series Frauenthal Grinder was specially engineered with direct-connected spindle and quill-type spindle (25" stroke) for fast precision-grinding of vital aircraft engine parts to millionths-of-an-inch tolerance.

PRECISION at low cost with Frauenthal Grinders

Grind to "AIRCRAFT Precision"... faster!

On all of your own toolroom and production grinding, you can get the super-precision demanded in grinding the most accurate aircraft parts by using Frauenthal "millionths-of-an-inch" grinders. Through more than a decade these grinders have been performance-proved on the toughest precision jobs . . . grinding parts for aircraft, jet and automotive engines; tanks; gunmounts; radar units; Diesel connecting rods; plug valves; large diameter high precision bearings and other industrial and military parts and assemblies, consistently, to *fractions of ten-thousandths,* best expressed in *millionths* of an inch!

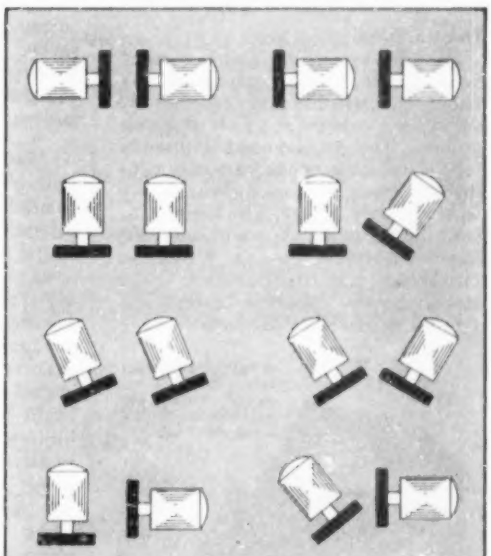
Save time and money by SIMULTANEOUS grinding of inside and outside diameters or faces

With Frauenthal Multiple-Head Cylindrical Grinders you save important time and lots of money because *simultaneous* grinding of *related surfaces* assures utmost precision and unfailing interchangeability of parts. Adaptations for super-precision boring or turning also can be engineered into these grinders for specific jobs.

What's YOUR Grinding problem?

Tell us, in confidence, what you want to grind. Frauenthal Grinders permit many combinations of grinding-spindle positions for a wide variety of simultaneous grindings of outside and inside diameters or faces. Large diameters can be ground to the extremely close tolerance of .000200" (200-millionths of an inch) *or better,* with assurance of uniform precision in concentricity, parallelism and roundness. Valuable details on request. We'll be glad to work with you on difficult grinding, boring, turning problems.

Many combinations of spindle positions for simultaneous grinding on all sizes of Frauenthal grinders



TEN STANDARD SIZES conforming to essential J.I.C. specifications

SERIES	TABLE SIZES	MAXIMUM SWING
1800	30"	60"
	36"	60"
	42"	60"
	48"	60"
2000	60"	72"
	72"	88"
2200	110"	120"
	120"	130"
	130"	140"
	140"	150"

WRITE FOR BULLETIN

Frauenthal Division

THE KAYDON ENGINEERING CORP. • MUSKEGON, MICHIGAN

WELDED DESIGN ELIMINATES BREAKAGE CUTS COST 78%

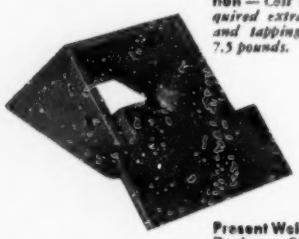
SINCE steel is a ductile material, it withstands shock loads without fracture. As a result, to eliminate shock failures, machine components can be simply changed to welded steel construction. At the same time, manufacture is made simpler, material cost is less, and fewer manhours are needed for production to cut costs an average of 50%.

The Problem

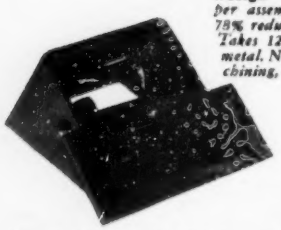
In the examples shown, breakage in the flipper assembly created service problems for this company. Because of limited clearance, it was impossible to increase wall sections.

The Solution

By converting to welded steel construction, the manufacturer was able to eliminate breakage completely, yet cut his cost from $4.50 to $1.00 per unit. The one and one half pounds less metal now needed actually produces a stronger, more rigid assembly than possible before. The entire unit is produced in the shop without waiting for outside sources. With less machining and less cleaning, fewer manhours are required to turn out a more dependable product.



Original Construction — *Cost $4.50, required extra drilling and tapping. Weight 7.5 pounds.*



Present Welded Steel Design — *Saves $3.50 per assembly . . . a 78% reduction in cost. Takes 12 pounds less metal. Needs less machining, less cleaning.*

How to Design in Steel and Cut Costs

Lincoln design specialists throughout the country are equipped to train product designers and production engineers on how to simplify designs for low cost manufacture. Design bulletins are also available by writing on your letterhead to Dept. 2208

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

they are directing men and not machines. They should try to appreciate the foreman's point of view and make every effort to hold their tempers, no matter to what extent they may be irritated. The boss should never try to show his superiority; few things annoy people more than being made to feel small.

The "yes-man" type of foreman will say that if the boss wants to engage in his favorite sport of being an "Indian Giver," the foreman should be a good sport and take it. But the trouble with being a good sport is that you have to lose in order to prove it. And a foreman cannot afford to lose face with his men.

Harry Kaufman
Philadelphia, Pa

•

SAFETY SNOOP

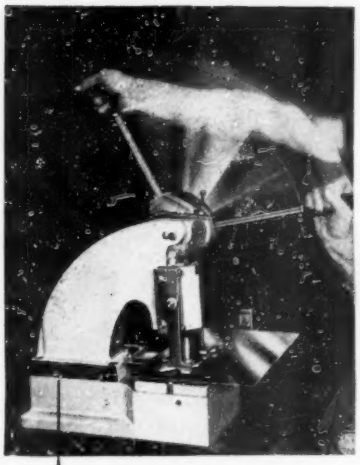
How should the problem of shop safety best be handled? Is a full-time safety engineer, with authority to specify changes, the answer, or will the workers operate better under a general safety program?

AL HAS THE RIGHT IDEA; the protection of employees against accidents should be the duty of a competent safety engineer, a man who is especially trained in this comparatively new technology. Safety gates, bars, and protective motions, if properly planned and designed, can speed up production and save their cost.

Foremen vary. Some think that a grown man should have enough brains and be smart enough to keep himself out of danger and that safety attachments just encourage a man to get careless. Other foremen go to the opposite extreme and spend so much time and money installing elaborate safety gadgets that production suffers and costs go up. As a rule, foremen do not have the experience or the training to know where, how, and what safety precautions should be taken to give proper protection without unnecessarily increasing costs.

A technically trained safety engineer knows where safety protection should be applied and where it is not necessary. He also has a good knowledge of which employees can be trusted on what jobs to keep the accident rate low. It must be remembered that accidents—in addition to causing great suffering and misery—are very expensive to the firm, and anyone who can reduce the frequency and seriousness of the general accidents can easily save considerably more than his cost if the firm has at least a moderate-sized payroll.

There is the case of malleable iron



PUNCH...
BLANK...
EMBOSS...
FORM...

Quickly, Easily, Accurately with a DI-ACRO* PUNCH PRESS

Deep throats — 6 and 12 inches — of Di-Acro Punch Presses make them ideal for many operations impossible to perform on most bench presses.

Holes of various shapes and sizes — as large as 4" in diameter in 16 gauge steel — can be punched. Vee shaped ram controls position of punch head assuring perfect alignment. Turret stripper, of exclusive Di-Acro design, strips material from punches of all shapes. Side and back gauges provide exact work positioning.

*pronounced Die-ack-ro

FOUR HAND AND POWER MODELS AVAILABLE

Di-Acro Power Punch Presses are designed for high speed production. Rated capacity, five tons. 180 strokes per minute. Motor driven flywheel and other moving parts are housed in a welded, steel cabinet.

Hand operated Di-Acro Punch Presses are easy to operate, ideal for short run production and experimental work Rated capacity, four tons.

PUNCH PRESS ACCESSORIES

Complete line of standard size punches in round, square, notcher, rectangular and oval shapes available in six clearances. Also special sizes.

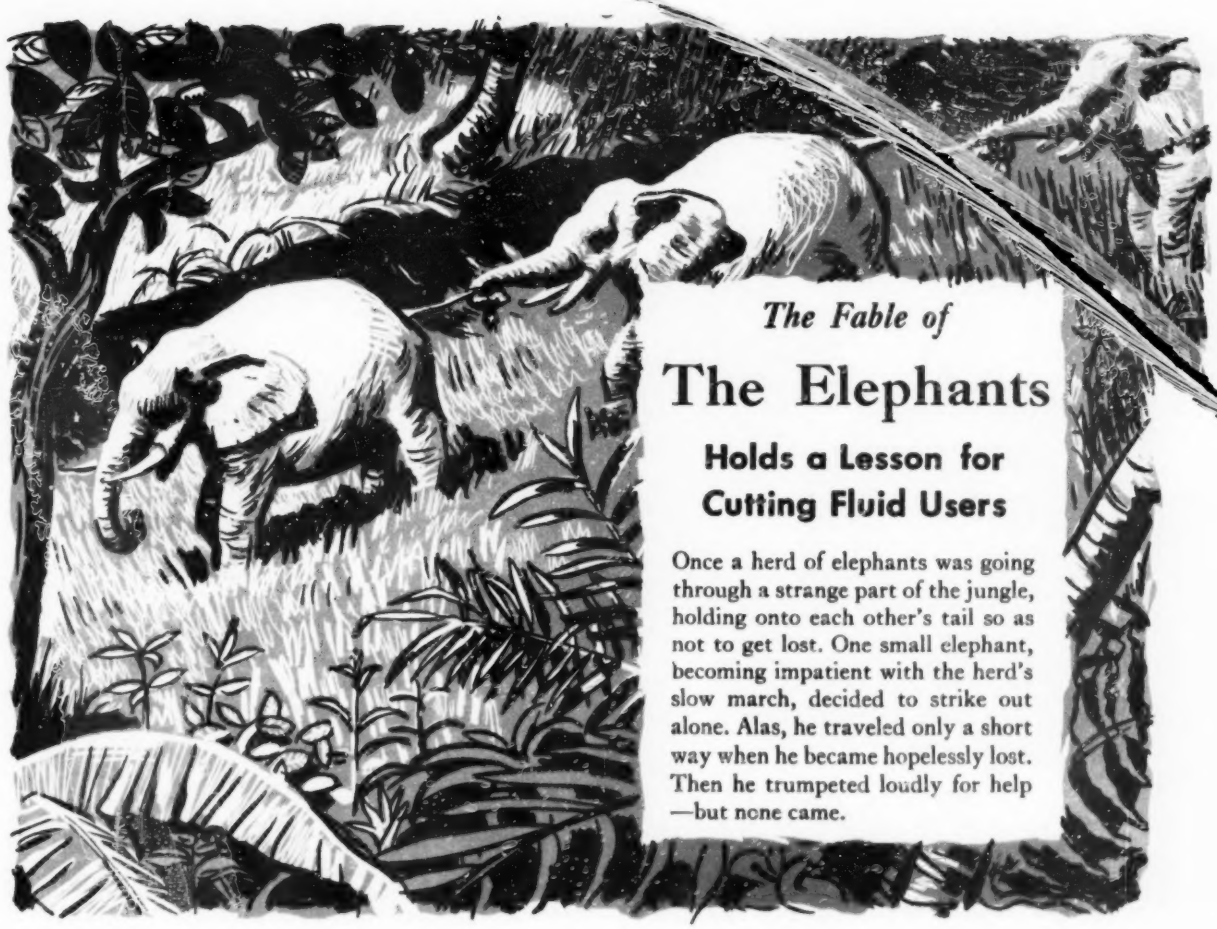
Send for 32-Page Catalog

Tells all about both hand and power operated Di-Acro Punch Presses, Benders, Brakes, Notchers, Rod Parters, Rollers and Shears. Punch and Die Cost Sheet included.

Creators of "Die-Less Duplicating"

O'NEIL-IRWIN MFG. CO.
311 8th Avenue
Lake City, Minnesota

di-acro PRECISION METALWORKING MACHINES



The Fable of

The Elephants

Holds a Lesson for Cutting Fluid Users

Once a herd of elephants was going through a strange part of the jungle, holding onto each other's tail so as not to get lost. One small elephant, becoming impatient with the herd's slow march, decided to strike out alone. Alas, he traveled only a short way when he became hopelessly lost. Then he trumpeted loudly for help —but none came.

The Lesson:

Like the little elephant in the fable, it is easy to get lost in the cutting fluid jungle. You need something to follow if you are to stay out of trouble. Realizing this, Stuart Oil has devised a unique Selector to serve as a guidepost to point out the path to the right cutting fluid. The Selector recommends cutting and grinding fluids which field experience has shown to be most suitable under average job conditions. Machinability ratings are listed, and complete instructions are given. Included are rules of thumb to follow when short tool life and poor surface finish are encountered.

To make going astray even more difficult, Stuart has developed the Dilut-O-Graph which tells how much cutting oil is required for a certain dilution when blending is done in tanks of different capacities. The Dilut-O-Graph ends costly guess-work.

Your Stuart Oil Representative will gladly give you a Selector and Dilut-O-Graph. And while he is in your plant, ask him to show you how Stuart cutting and grinding fluids will improve your machining results.

FREE CUTTING FLUID SELECTOR AND DILUT-O-GRAPH

In this folder is Stuart's Cutting Fluid Selector and Dilut-O-Graph. They are double-barreled protection against mistakes in selecting and preparing cutting fluids. Instructions are included. Fill out and mail coupon.

More Than a "Coolant" is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2729 S. Troy St., Chicago 23, Ill.

In Canada: R. W. Horsey Canada, Ltd.
Subs. D. A. Stuart Oil Co., Ltd.
3575 Danforth Ave., Toronto

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

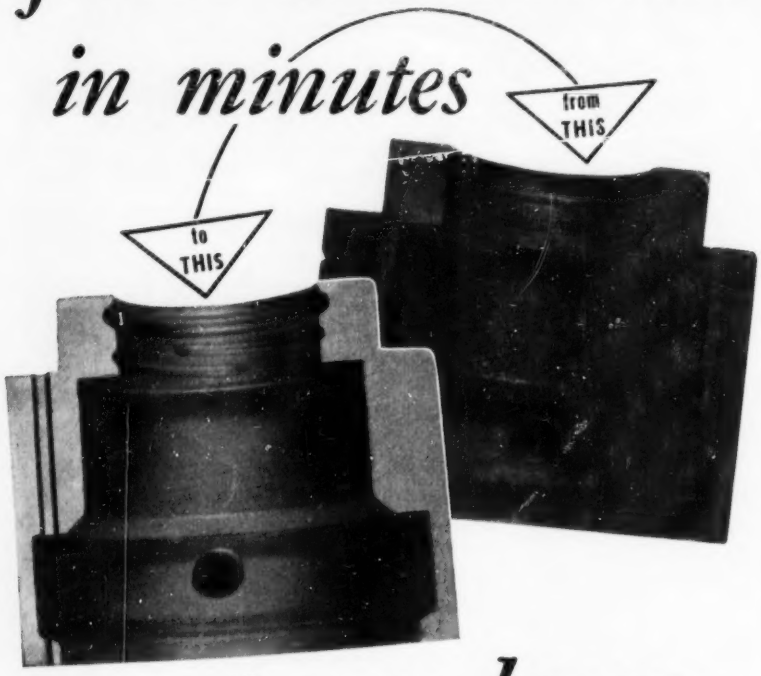
D. A. Stuart Oil Co., Ltd., 2729 S. Troy St., Chicago 23, Ill.

☐ Have Stuart Representative Call
☐ Send Cutting Fluid Selector & Dilut-O-Graph Folder

Your Name .....

Title .....

finish TOOLS, DIES and MOLDS *in minutes*



...and *save hours* with LIQUAMATTE wet blasting

It takes only 30 seconds to 10 minutes to finish tools, dies, molds, engine parts, etc. with a Liquamatte — an operation that formerly required 1 to 6 hours by hand methods. Scale, fine burrs and grinding lines are removed in a fraction of the time previously possible. For example, savings as high as 80% have resulted on some parts at the Oling Tool Company.

Liquamatte Wet Blasting has eliminated many manual surfacing operations, transforming precision finishing into a mass production operation. It has eliminated all manual polishing except on surfaces where a mirror finish is desired. And the mirror finish is achieved in far less time on a Liquamatte finished surface.

See how Liquamatte Wet Blasting can save time and money for you. *Send today for the bulletins of your choice below.*

THESE BULLETINS TELL HOW

Save Time on Tools, Dies, Molds.

Save Time on Glass Molds

Save Time on Plastic Molds.

American LIQUAMATTE WET BLASTING

WHEELABRATOR & EQUIPMENT CORP.

317 S. Byrkit St. Mishawaka, Indiana

clamps for harrow teeth. These were cast in white iron and then heat-treated to make them malleable, but unfortunately the small castings in both stages looked just alike and mixups occurred with considerable customer-dissatisfaction and a lot of expense for replacements. The foreman attempted to correct the trouble by having a final inspection into the storeroom truck whereby a workman tested every casting by hitting it with a hammer. The malleable castings were not damaged but the white iron ones broke into pieces. This worked, but it was slow and expensive; furthermore, the workman occasionally socked his fingers and also would get white iron splinters in his hands. The safety engineer condemned this method, had the pattern changed so there was more draft to the clamp lugs, which reduced foundry losses, and then made the final operation a setting squeeze in a power press with automatic feed at 75 pieces per minute. All good malleable pieces took the set and fed into the storeroom truck, but every white iron or improperly annealed piece immediately broke and fell into the scrap tote pan.

The above is an example of how in one plant the safety engineer eliminated all defective pieces and reduced accidents to almost zero, since the operator only slipped the pieces in the chute which fed the press.

A safety engineer should reduce production costs as well as reduce accidents to be an asset to his firm.

George P Pearce
Albuquerque, NM

SAFETY IS CONTAGIOUS and any shop that is infested with it does not require an engineer or the foreman to promote it. If the key personnel have been properly trained and practice the simple fundamentals, the rest of the shop will catch on very quickly. Safety is a subject that requires an injury or an accident to bring it to light.

As long as the accident rate in the shop is low or at a normal rate, safety is something that other shops are concerned with or go through great pains to promote. Posting of safety posters through the shop is a good way to cover the cracks in the wall or dress-up an unpainted partition. Almost every plant in New Jersey has No Smoking signs posted on the walls because the law requires it, but over 80% of the shops permit the men to smoke because it is almost impossible to enforce the law. It is ridiculous to tell the men that they cannot smoke in a plant with concrete floors and steel machinery while in another part of the shop

THEY CAN TAKE IT...and DO!
...and still maintain accuracy

STANDARD *Dial Indicators*

Built to stand the knocks—often unavoidable

NEW - with Years of Service Ahead

REGULAR
AGD SERIES

AGD SPECIFICATIONS THROUGHOUT

Made in 22 models including 4 dial diameters, 7 different graduations. Also 90° models (stem perpendicular to back). Long Range and Long Stem types.

Decimatic
SERIES

AGD SPECIFICATIONS except Range and Marking

For especially fine checking, extra high repeatability and accuracy. Marked in decimals. No whip of hand. 16 models.

This One Was New...
Years Ago -
Still Serviceable

Obviously it has withstood hard usage, yet indicators such as these are constantly being reconditioned (at a fraction of the original cost) — to return still more dependable service to the owner.

You wouldn't treat your watch the way some indicators have to be treated. Standard Dial Indicators are built to give continuing accuracy while standing the knocks.

Outstanding Reason for the Durability Built into Standard Indicators is the

SHOCKPROOF MECHANISM

Proved by experience to prolong instrument life greatly, Standard's Shockproof Mechanism protects internal parts right from the spindle on. Furnished regularly in most models, not treated as an optional extra. Standard Indicators give longer, trouble-free life, need fewer repairs, are dependable. These facts add up to "Greater Economy."

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

however
wherever
whenever
YOU HAVE A
SHIM PROBLEM
Get the right,
economical answer
from
LAMINATED
SHIM
COMPANY, INC.
"SHIM HEADQUARTERS" SINCE 1913
Shim design is modern design. It saves precious, extra, needed hours of machining parts to needlessly close tolerances.
Today the pressure is on speed. Production lines must move fast. Machine time has to be reduced. Two seconds with a shim can save two hours with a machine. Without sacrifice of quality in your end product.
So — when you face a shim situation, it will pay you to check with "Shim Headquarters." Don't just buy a stamping when you need a shim. Our engineering service can be important to you.
ONLY LAMINATED SHIM OFFERS YOU ALL 5
SEND TODAY FOR LITERATURE!

ONLY LAMINATED SHIM OFFERS YOU ALL 5 SOLUTIONS

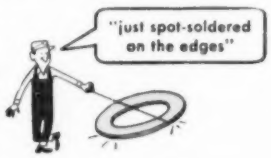
Here's a quick picture of the shimming methods which are at the disposal of designer and production engineer. In actual use, many factors affect choice of proper type, for shim engineering has become a science unto itself. Be sure you check with us for an impartial recommendation. Remember that only The Laminated Shim Company offers you all 5 types of shims.

THE LAMINUM® SHIM

SIMPLY PEELS FOR ADJUSTMENT

The LAMINUM® Shim is made up of layers of .002 or .003 inch brass or steel, metallically bonded together over their entire surfaces. Peeling laminations with a penknife gives simple, accurate adjustment; no counting or miking is necessary. Shim is rigid, easy to handle, less compressible than solid metal. No grit can lodge between layers. Available in from 3 to 63 laminations.

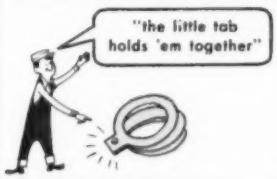
THE LAMISOL* SHIM



FOR QUICK, ASSEMBLY LINE USE

The laminations of the LAMISOL Shim (in brass only) are joined by spot-soldering. This type of shim is just right for high speed, repetitive assemblies, regardless of the shim size involved. Spot-soldering makes a very firm "pack," but the laminations are quickly removed. Laminations within the same shim do not need to be all the same gauge, nor is the maximum number of layers limited.

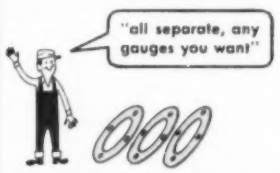
THE LAMITAB* SHIM



FOR SUPER SPEED, THIN GAUGE SITUATIONS

The LAMITAB Shim is a patented exclusive developed by us for the extremely fast moving production line. The little tab holds the shims together firmly, yet is easily removed. Different metals can be used in the same shim. The LAMITAB Shim is unsurpassed, cost-wise and time-wise when properly engineered. Maximum number of laminations is 4, to a total thickness of .010 inch.

THE LOOSE LEAF SHIM



FOR UNLIMITED FLEXIBILITY

The loose leaf shim is the simplest of all custom-stamped shims. It is completely flexible. There is no limit on number or gauge of each shim – and an occasional situation will require this "wide open" adjustment. In such cases, sets incorporating a variety of gauges are made up. Then, by removing one gauge and inserting another, a full scale of fine gauge adjustment is made possible.

PACKAGED SHIM STOCK

READY FOR EASY USE, WITHOUT WASTE

Our Packaged Shim Stock is available for maintenance work from your Industrial Distributor. 6" x 100" roll feeds through package slots, *as it's used*. Available in 11 gauges, from .001 to .010", brass and steel. Heavier gauges to .032 are packed flat, two 6 x 25" sheets to an envelope. Laminated shim stock for maintenance use is also available in a variety of thicknesses and lamination arrangements.

*T.M. Applied For

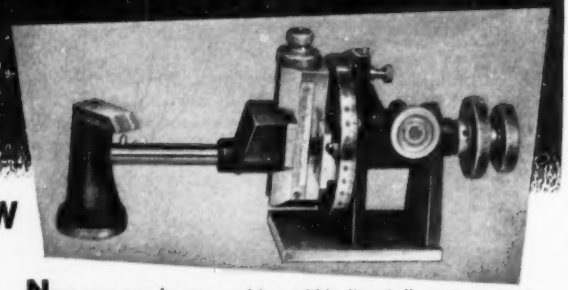
ONLY LAMINATED SHIM OFFERS YOU ALL 5

LAMINATED SHIM COMPANY, INC. 3110 UNION STREET, GLENBROOK, CONN.

Set Up Angle-Tangent-to-Radius Forms

IN MINUTES

with the NEW



Now you can have precision within "tenths" and set up in *one-fourth* the time. Tangi-Matic has a direct-reading micrometer *built in*, eliminating "mikes", height gages, Jo Blocks *and errors*. Even novice operators obtain extreme accuracy. Tangi-Matic dresses any concave radius down to .032", full 180° with equipment we give you. Set-ups can now be made without removing dresser from your grinder chuck.

Our new model has *removable dressing arm*, permitting the use of extensions for dressing *large wheels*. Wearing surfaces are hardened, ground and lapped to a mirror finish, assuring you of years of extra service over ordinary dressers. Lead screw is hardened and ground to extreme tolerances. Furnished complete with master setting block, small radius attachment, plastic hood and carrying case. Write for literature and name of representative in your area.

ACCURACY PERFEX OUR CREED

PERFEX GAGE & TOOL CO.

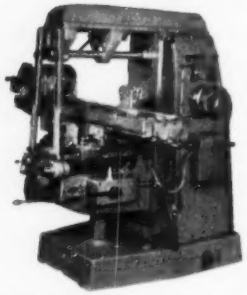
Dept. AM, 124 Avery Street • Mt. Clemens, Mich.

CERVINIA ULTRA

Universal Milling Machine

DELIVERIES prompt

SPARE PARTS available



COST very low

SERVICE nationwide

SPECIFICATIONS: MORSE TAPER NST No. 50 • WORKING SURFACE: 55" x 12½" • POWER FEED RANGES: Longitudinal 42½", Cross 12½", Vertical 17 3/4" • 18 FEEDS: Range 3/64" to 12" per minute RAPID TRAVERSE: 80" per minute • 12 SPINDLE SPEEDS: Range 25 to 1000 rpm MOTOR 7½ HP

For further information, write or call: MISAL MACHINERY, INC.

ENGINE LATHES · RADIAL DRILLS · TURRET LATHES · **MISAL** · SHAPING MACHINES · MILLING MACHINES · GRINDING MACHINES

1 EAST 53RD STREET, NEW YORK 22 • ELDORADO 5-7278

welders are continually exposing a flame or shower of sparks a great deal hotter than a cigarette.

If the men do not heed these signs with the consent of management, why should they pay any attention to the propaganda relating to accidents? These men that work in the factories are the same ones that ride through red lights, smash cars on the highways, and dive in shallow water. Warning signs are posted for the other guy, not me.

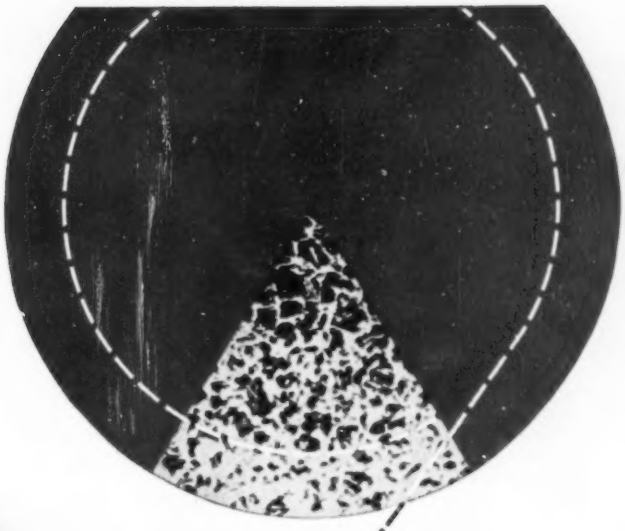
If a company really feels that safety should come before production it can put on a very effective program and enforce it. The program should include the entire plant and every man is to be his own protector. A shop can have a very efficient system in effect but the office will have frayed and exposed wires on the calculator. The boss will race his car into the driveway and brag how he drove to the next town in fifteen minutes. He will criticize the truck driver for not making his trips in less time.

The foreman is the key man in promoting safety. He should instruct every operator to be safety-conscious not only in the operating of his machine, but the handling of material, walking through the plant and riding back and forth to work. If a man does not take his lesson to heart, the foreman will have to get tough and let the worker know that either the employee will have to toe the mark or look for another job. When the men know that the foreman is sincere, the accident rate will improve without safety posters or safety engineers.

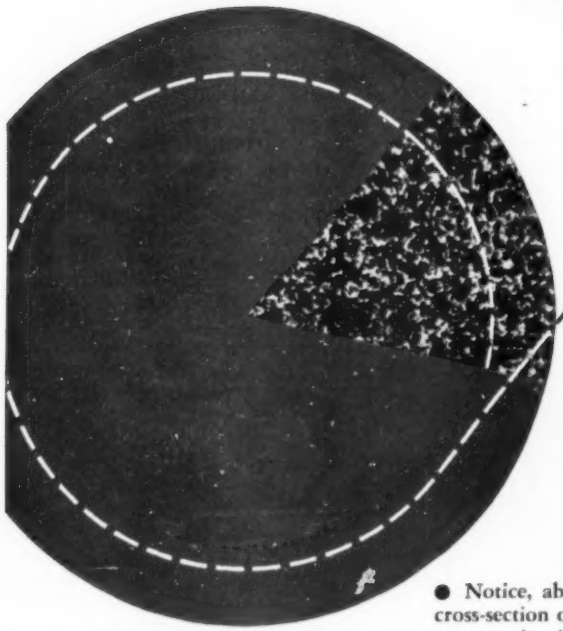
Frank J Zarnowski
Rutherford, NJ

SEVERAL YEARS AGO I was a member of a safety committee who established a national safety record of 3,226,920 man-hours of exposure

"They must be putting a little more detergent in that machine oil, Herbert. The ring around the tub hasn't been nearly so hard to scrub off."



The "decarb" (light-colored) area in the ordinary heat-treated bar at right must usually be removed before parts can be made from the stock.



Notice that this Republic carbon corrected alloy steel bar has had full carbon content restored to outer edges by carbon correction.

HERE IS WHERE Republic Carbon-Corrected Alloy Steel Bars help you make a profit

● Notice, above at the right, the "decarb" area in the outer edge of the cross-section of a cold drawn alloy steel bar as ordinarily heat treated. Then compare it with the cross-section below at the left. Notice how the carbon has been restored by carbon correction even to the extreme outer circumference.

Here, in the outer rim of Republic Carbon-Corrected Alloy Steel Bars, is the profit-area for your machine tools . . . the part of the bar you don't have to machine away into chips and shavings.

Let our Republic 3-Dimension Metallurgical Service work with your metallurgists and production men to adapt Republic Carbon-Corrected Cold Drawn Alloy Steel Bars to your products. Your Republic Steel salesman can arrange for the Republic Field Metallurgist to call at your convenience.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

LAB FIELD MILL

3-DIMENSION Metallurgical Service

. . . combines the extensive experience and coordinated abilities of Republic's *Field, Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide users of Alloy Steels in countless industries to the correct steel and its most efficient usage. IT CAN DO THE SAME FOR YOU.

Republic COLD DRAWN
REPUBLIC STEEL
ALLOY STEEL BARS

NILSON FOUR-SLIDE

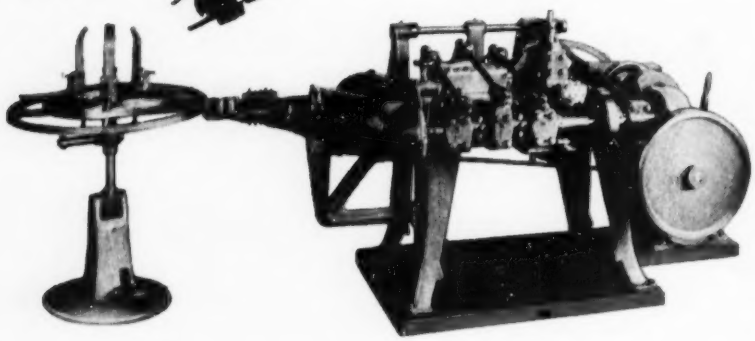
It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

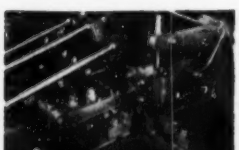
Wire and Ribbon Metal
FORMING MACHINES

UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with NILSON'S open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

Model SF3 NILSON 4-SLIDE, shown below, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.





Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.

Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

Range of sizes

Wire Forming
1/32" through ½" wire. Feeds up to 32".

Ribbon Stock Forming
$\frac{1}{32}$" through 3½" wide material. Capacity of press section 5 to 30 tons; 50 to 75 tons in heavy duty types.

For specific recommendations — send details of your operation.

THERE'S NOTHING LIKE A NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY
1519 Railroad Avenue • Bridgeport 5, Connecticut

CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • HAMILTON, ONT., CANADA

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

without a lost-time accident. There were an average of 828 workers employed during this period. This record had special significance as 12% of those employed had some physical handicap.

We had complete management approval and cooperation; that made safety a part of everyday business. This company took a personal interest and active part in the safety program. We had two groups of safety committees. One was composed of foremen and supervisors, instructed and kept posted on all current events on safety news and activities. This group was permanent as a first line of defense. They were trained to look for and recognize any unsafe act or condition that might require immediate remedial action.

The second group consisted of employees from various departments. These men were instructed in the fundamentals of safety, and trained to look for mechanical hazards. They reported to the foreman or supervisor. This group were restricted to a six months' term on the active safety committee. After serving this period they were placed on the reserve list. They were however encouraged to keep their interest in safety by reporting any hazards. They were not permitted to another term in their respective department until every employee had had a turn. Over a period of years 600 employees had served.

This rotating system was very successful, as clearly demonstrated by the results obtained. Committee meetings were arranged on a monthly basis; all known hazards were discussed, investigated, and the necessary corrective measures taken. Each month we concentrated on a specific subject, starting with good housekeeping, then machine hazards, fire protection, etc. A continuous program is in effect at all times.

We used visual training aids, motion pictures, posters, etc. Guest speakers from other organizations helped keep up the enthusiasm of the group. We also had impromptu inspection trips of the entire plant. Any piece of equipment coming into the plant was first checked by the safety department to see if it met safety standards.

Protective personal equipment plays an important part in the safety program. This includes safety goggles, various types of aprons, helmets, leggings, various types of gloves, and other protections.

All the programs are planned on a departmental basis. At the annual safety banquet certificates of merit were presented to the departments having the best records. This inject-

ed a keen spirit of competition in the activities of various departments.

A safety program is not an additional expense to the company, regardless of its size. Good housekeeping results in increased quality production. It cuts down loss of time due to accident and injury. A successful safety program means a low insurance rate. Most important of all, it shows a humanitarian interest of management for its employees.

A E Salmons
Philadelphia, Pa

SAFETY SNOOP

MENTAL LAPSES of human beings cause more serious accidents than any other thing. It is a difficult point to understand why an individual will will go along for years without a scratch and then lose a hand in a press which he had been operating for years. Yet time and again the serious accidents are those that occur to old-timers on the job. Is it because the machine fails to do its job or is it because the operator becomes too automatic and mentally sluggish? More of the second, we believe, for as an individual continually works on one job he becomes part of the machine. Thought must be given to the operation of the machine but as we grow "older" in our use of the machine, we fail to realize that habit is setting in—the habit of becoming automatic and thus a tendency to lull the brain into sleep. Suddenly we find our mind wandering to that nice cool fishing spot or the golf course . . . and then it happens. No matter how many guards are placed on the machine, mental lapses will cause the accident. We are not alert and we are tempted to do the unreal without knowing it.

How can we prevent accidents, for it is a creeping paralysis. Safety programs, safety studies and safety engineers are some of the tools.

The first and most important part of any safety program is to make a complete study of all machinery and the present guards and operating methods. It is strange that methods

JOHNSON BAND SAWS

SPECIFICATIONS—MODEL B

Capacity—5″ rounds, 10″ flats.
Height Overall—(Closed)—32″.
Blade Length—7′5″ x ½″ x 23 ga.
Floor Space—46″ x 28″.
Weight—(Uncrated) 235 lbs.
Crated 280 lbs. Boxed for Export 400 lbs.
Wheel Diameters—10″.
Motor—⅓″ H.P. any voltage available.
Speeds—45, 90 and 150 ft. per min.
Casters—Optional at slight extra cost.

MODEL J

Model J pictured, 10″ x 18″ Capacity, available as a wet or dry machine. Big, rugged, adaptable to any cutting job.

WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

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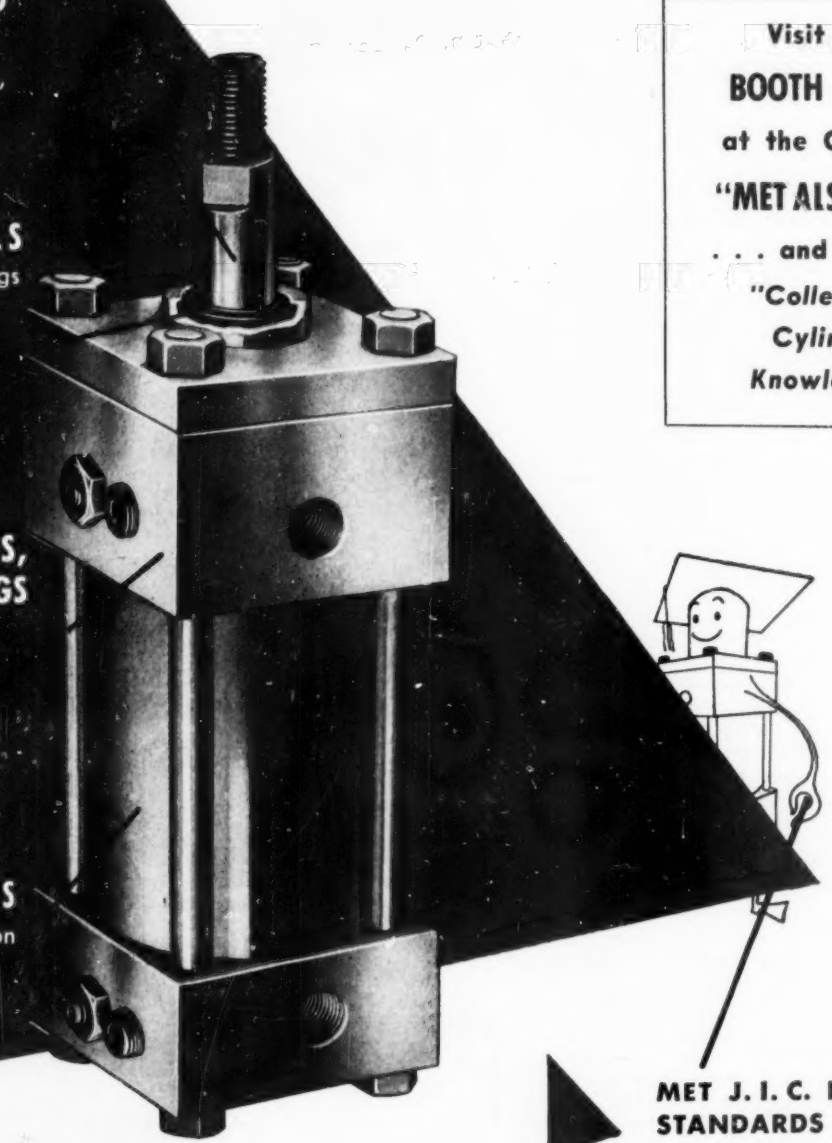
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage

BRASS BARRELS
Eliminate Rust and Corrosion



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. . . and see our
"College of Cylinder Knowledge"

MET J. I. C. PNEUMATIC STANDARDS years before their adoption in 1950.

SPACE-SAVING SQUARE DESIGN originated by Miller in 1945.

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Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

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AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
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have a great deal to do with accidents. The operation which an employee must perform many times may have danger written all over it. Always correct the method of feeding the press or handling the tools to a point where as much danger has been removed as possible without a decrease in productivity. Then study the guards which will prevent the operator from normally getting into the working parts of the machine. The art of this work is a specialty and should not be left to the individual foreman. Safety engineers who have had years of experience should be employed. Do not rely upon those who want to wrap the machine in a sheet of steel, thus reducing productivity of the machine. This is too apt to be the case when inexperienced help is used or someone just interested in guarding the machines.

Guards can cause accidents. How? Well, if a machine is improperly guarded then the operator takes risks in order to get out production and either removes the guards or operates around them. This sets up a dangerous pattern and results in more accidents. True, the company is protected, but the indviidual is not.

A foreman can do much to help hold accidents down in his department by reminding his workers to use caution in operation. He can set up his production rate so as not to overload his machines, thereby forcing his employees to take no unnecessary chances in order to reach a quota. Safety meetings to discuss ideas, promote the thinking and acting of the employees, will help. People are interested in their own welfare if given a chance to be.

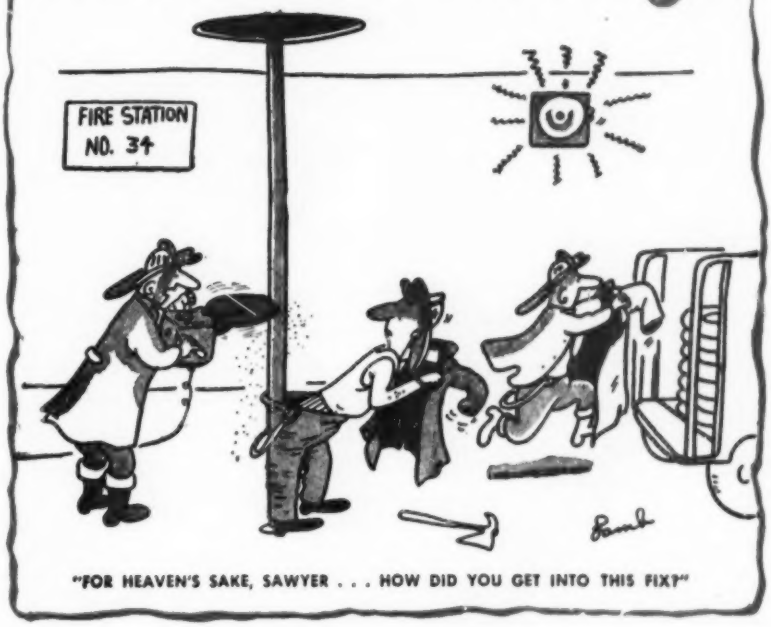
A safety engineer with the basic knowledge and years of experience can aid in properly evaluating and designing the guards and system.

Now comes the day when all machines are seemingly properly guarded and all are considered completely safe to operate, yet a man loses his hand. Why? The case is simple. Bill

"Your application looks OK; now for a few questions."

the *tougher* the cutting job . . .
the *better* the opportunity for . . .

Abrasive Cutting



"FOR HEAVEN'S SAKE, SAWYER . . . HOW DID YOU GET INTO THIS FIX?"

Unusual cutting conditions like this are the exception . . . but whether you have a specialized application or a mass production job, you can depend on Allison Wheels. Whatever the material to be cut, there is an Allison Abrasive Cutting Wheel processed and formulated to fit the job. This means faster cutting with fewer rejects and reduced operating costs.

If you have a cutting problem, go to Allison — the specialist in abrasive cutting.

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NELCO CARBIDE TIPPED SLAB MILLS—

SET NEW PRODUCTION *Records!*

Machine Army Automatic Rifle Receivers in 1/5th the time . . . to better finishes . . . with 30 times more pieces per grind than conventional cutters!

An amazing story, but TRUE! Working on tough, scaly Perlitic Malleable iron castings, Nelco carbide tipped slab mills took a healthy .100 - .125 bite—a full 3½ inches wide—on a 3 horsepower machine at the incredible feed of 11½ inches per minute! Not only did the Nelco slab mills surpass conventional cutters in speed, *but produced better finishes, 400% more production per machine!*

HERE ARE ACTUAL PRODUCTION FACTS		
	High Speed Steel slab mill 80 RPM	Nelco carbide tipped slab mill 410 RPM
Feed (in/min)	1¾	11½
Production per machine	6 pcs. per hour	29 pcs. per hour
No. of pieces per grind	8	250 (average)
Finish	Wavy—needed extensive polishing	Superior machine finish—only minor polishing needed

Production test this amazing slab mill in your shop—Investigate NELCO today! This example is typical of the time-saving, money-saving benefits users report when using Nelco carbide tools. With nearly 800 tools regularly stocked, you can order —and GET—"special" tools at standard prices.

For full information on the *complete* Nelco line, send today for 48 page catalog.

NELCO TOOLS

For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

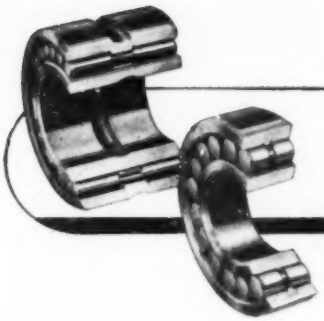
has been working on the press for ten years and was considered the best man in the department—never had an accident, never took a chance, wouldn't operate without a guard on his machine. Yet yesterday he lost his hand. Why? How?

Frankly, he doesn't know. First thing he realized was that the press had crushed his hand. The guard had been moved and he was out of operating position. The guard was in place just before the accident because the foreman had stopped to talk to Bill about the job and checked the machine. What then caused the accident? Only thing that it can be is a mental lapse. Bill has no recollection of moving out of operating position or pushing the guard aside . . . yet his hand indicates the action taken.

How can we prevent these accidents? Can we prevent mental lapses? Can we stop people from taking chances—the chances which they don't even remember taking? Possibly this will come in the push-button era. A man is only as good as his alert mind. He fails to continually operate safely. His human makeup is that of chance, therefore he reverts back into the easy but dangerous way, without realizing that he is doing so.

Safety programs and safety engineers can and must go to work on our present problems. But we must also continually study human behavior and its reaction to our habits in this industrialized world. This is not a safety engineer's job nor is it a foreman's responsibility. We need case histories and we need to have trained specialists analyze these case histories. It is a phase which all companies must support, it is a worldwide problem. Safety is a *must*, but a study of human mental habits and lapses is a necessity.

Charles D Townsend
West Hartford, Conn



Over 33% Greater Capacity For The Same Size

There is a challenge facing manufacturers today to build smaller and more compact machines with extra precision and to combine more operations in each machine. This makes the selection of the proper bearings extremely important. A definite plus factor in this selection is the availability of a precision bearing that will deliver extra load carrying capacity in a minimum amount of space.

Obviously roller bearings, and particularly those of the small (needle) roller type occupy far less bearing space for equivalent capacity than ball bearings. Roller bearing capacity is built up in proportion to the effective race and roller contact provided. Thus a full type roller bearing *without space wasting cages* should provide the greatest capacity of any type of anti-friction bearing. However, to offer a perfect bearing the resulting full roller complement must be prevented from skewing and binding where misalignment occurs in the application.

The Guiderol bearing is the accepted answer to all these requirements considering precision, load capacity,

Bearing	McGill Guiderol No. GRI-209	Brand A Bearing	Brand B Bearing	Brand C Bearing	Brand D Bearing
Published Load Rating	8370 lbs.	6700 lbs.	7000 lbs.	5520 lbs.	6080 lbs.

Capacities at 2500 hours average life at 100 RPM

long life, versatility of mounting, and ease of lubrication. Published ratings show the Guiderol CT Series bearing has over 33% greater load carrying capacity than the average of the four highest rated interchangeable bearings. As a result, a Guiderol bearing at least one size smaller can often be substituted with the necessary shaft and housing requirements reduced in size and cost.

How Rollers Are Guided

In the Guiderol bearing design the grooved rollers with full race width contact are prevented from skewing by a center guide rail. Normally the rollers run on a true axis

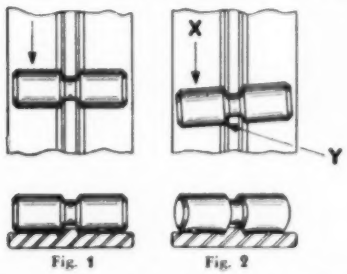
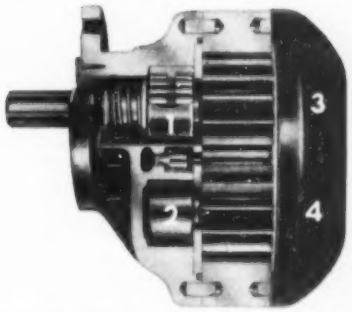


Fig. 1 Fig. 2

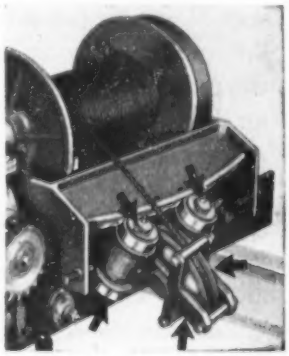
— not contacting the rail and thus need no correcting. (Fig. 1) Should misalignment cause a shift off center (Fig. 2) the leading end of the roller is retarded by contact with the rail at location Y. The trailing end catches up, relieving the rail contact, and the roller then resumes normal operation.

Typical GUIDEROL® Bearing Mountings

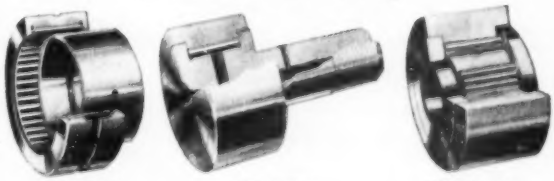


On a Hydreco Gear Pump Idler and Drive Shaft, 4 Guiderol bearings are used. The longer rollers of the Guiderol bearings are effective virtually to the edge of the races. This gives substantial support close to the gear and materially reduces shaft deflection.

Four Guiderol bearings support and guide an automatic spooling attachment across the face of the reel track on a 20,000 pound Gar Wood Reel-Rite Winch. The guided roller principle prevents skewing of rollers in the 4 vertically mounted bearings even with a 10,000 pound angular load per bearing. A fifth Guiderol bearing in the sheave provides added stability and eliminates binding due to off-center loading.



MULTIROL® Bearings



SE Series CF Series CYR Series

A new 140-page Bearing Reference Guide complete with 30 pages of vital engineering data has just been released by the McGill Manufacturing Company.

It has the full story on the advantages of Guiderol Bearings and in addition contains complete information on the well-known Multirol CF, CYR and SE Bearings. *Send now for your copy of the McGill Catalog No. 52.*

McGILL® — Precision Bearings

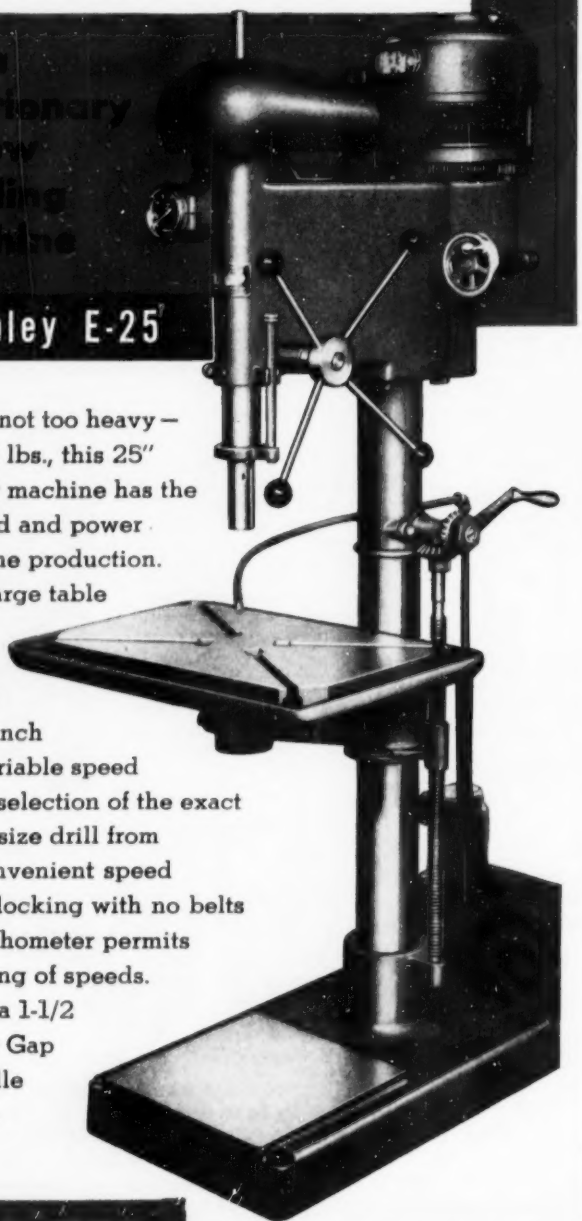
McGILL MANUFACTURING COMPANY, INC.
300 N. Lafayette Street, Valparaiso, Indiana

BIG SWING—

MEDIUM WEIGHT

a revolutionary new Drilling Machine

Sibley E-25



Not too light, not too heavy—weighing 765 lbs., this 25" swing drilling machine has the required speed and power for high volume production. Accuracy of large table with coolant trough is maintained to .0007" in six inch radius. The variable speed drive permits selection of the exact speed for any size drill from 1/8" to 1". Convenient speed control is self-locking with no belts to change. Tachometer permits accurate reading of speeds. Powered with a 1-1/2 H.P. Axial Air Gap Motor. 5 spindle speed options.

SIBLEY

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TRUE CONFESSIONS

HOW MUCH IMPORTANCE should a foreman place on always being right, always having the answers? Absolutely none. What more irritating or infuriating a creature than the man or woman who is always right? I have never met a human being who was always right and those whom I have met who are nearly always right have usually been a pain in the neck. They can seldom conceal the fact that they are nearly always right; it seems to be sticking out a mile, to the annoyance and discomfort of those of us who are quite often wrong.

Psychologically, it is wrong for an executive who controls labor to be always right. It has a depressing effect on the others who gradually become shy of offering suggestions, and many valuable hints are thus lost to the company. When men or women feel dwarfed or overshadowed, they never give of their best.

My experience is that the person who is always right is a niggling sort of person, a poisonous growth who gives ordinary folk the bile. Walking through the shops a few days ago with an "always-right" colleague I, as a matter of interest, directed his attention to an interesting execution on a modern boring mill. A spherical seating was being machined on an awkwardly shaped casting and the setup was almost a work of art on the part of the operator. My always-right colleague, chock full of micro inches and other awesome platitudes, so far as heavy rolling mill work is concerned, commented "Is that truly spherical? To get such a surface truly spherical to within two ten thous . . ."

I am a plain man, accustomed to apply the methods most suited to the quality of the work on hand, with a view to rapid and economical production. What little finesse I am capable of deserts me in such circumstances and I fear my reply

"I knew a raise was a ticklish subject with you, Mr. Duff . . ."

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with Heller NUCUT
wavy teeth Coarse, fine and extra-fine teeth all combined on one file for fast, deep, double-action cutting. Even, scratch-free finish. No chattering. Longer file life. ORDER FROM YOUR LOCAL DISTRIBUTOR
Notice NUCUT patented tooth arrangement in this greatly enlarged section.
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FINE
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HELLER BROTHERS
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look for the white tang
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THESE THREE FAMOUS FILES ARE MADE ONLY BY HELLER BROTHERS
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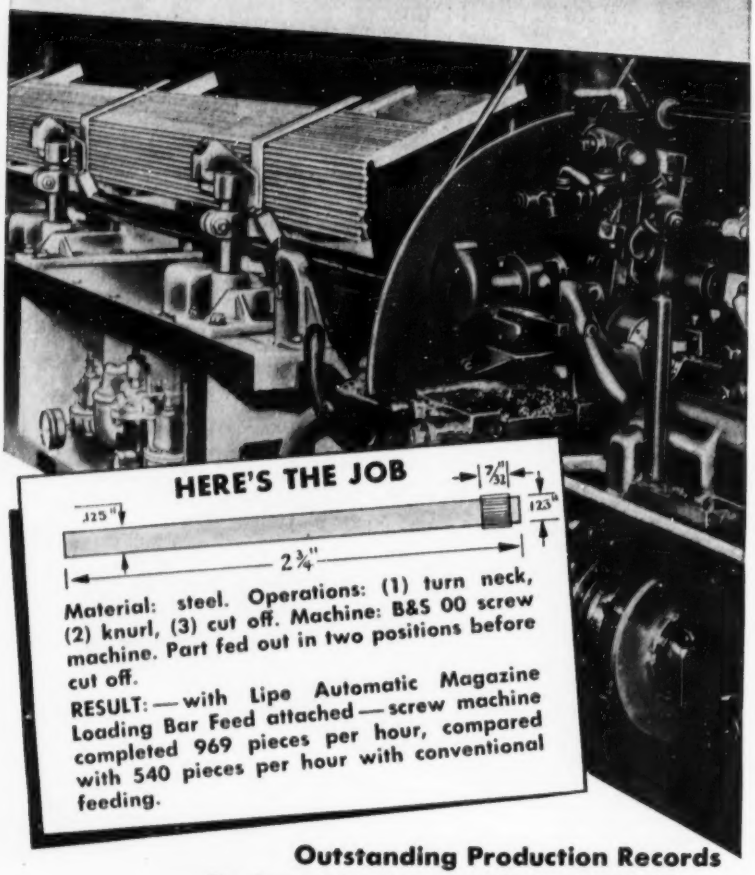
A New Record

PRODUCTION INCREASED over 80%

By Lipe Automatic

Magazine Loading BAR FEED



HERE'S THE JOB

Material: steel. Operations: (1) turn neck, (2) knurl, (3) cut off. Machine: B&S 00 screw machine. Part fed out in two positions before cut off.

RESULT: — with Lipe Automatic Magazine Loading Bar Feed attached — screw machine completed 969 pieces per hour, compared with 540 pieces per hour with conventional feeding.

Outstanding Production Records On Great Variety of Work, BECAUSE —

- Stock is fed to screw machine *all the time* — not dependent upon operator.
- With Model AML you get maximum output of screw machine — No "Cutting Air".
- Pressure constantly behind stock — no bounce.
- Eliminates feed fingers.
- Avoids multiple feed finger feed-outs.
- Saves set-up time.

Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem . . . no obligation.

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

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would not be acceptable for publication in AMERICAN MACHINIST.

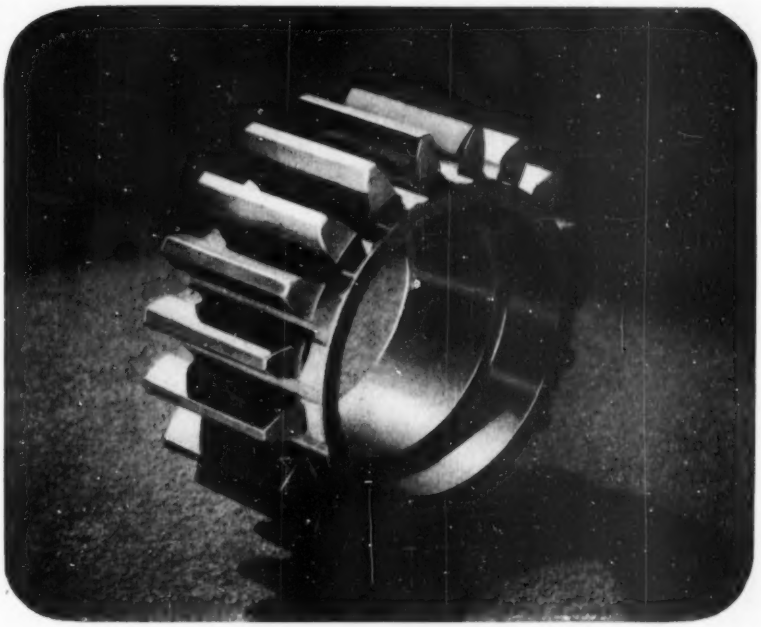
The always-right foreman is a menace in the workshop which, to be a success, should house a collection of men and women all giving of their best and vying with each other to excel. The foreman who can inspire and maintain such an atmosphere in the shops is a successful foreman. The way he does it, the methods he employs, are of secondary importance and if he could inspire happy eagerness in the shops by occasionally being wrong, then he would be right to be wrong. From experience, I should say that his chances of gaining and retaining the respect, even affection, of his men would be much greater.

Is Al's attitude that he can afford a few stumps correct? Yes, that is the right attitude. Ed's chief worry seems to be that he cannot afford to admit that there is something about a problem job that he does not know. Actually, he cannot afford not to admit his ignorance, temporary, perhaps, on this occasion. A foreman, like a man at the bench, can only give of his best if his mind is clear and free from worry. Ed, quite clearly, is worrying much more about the men's opinion of his capabilities than about not knowing the answer to his particular problem. This is a form of vanity which afflicts many foremen, mostly the younger ones and, looked at sensibly, there really is no problem except the problem of vanity. A foreman must know that for him to be consulted by, say, the manager makes him, the foreman, feel that he matters, that he is of some consequence in the company. Such a feeling brings in its train an eagerness to excel, to prove worthy of the confidence which consultation suggests. The normal man at the bench or machine reacts in exactly the same manner to the foreman's show of confidence in his, the man's, judgment and ability. In both examples a compliment is paid and no impartial foreman would withhold a compliment. Genuine and deserved compliments are the cement that holds the industrial fabric together.

It is open to doubt if the "know-all" with his airs and graces and his often transparent pretensions, is ever truly respected. If he is powerful enough, he may be feared, may get a lot of lip service but my experience suggests that genuine respect goes out to the fair-minded, tolerant foreman who is prepared, when occasion requires, to consult with those of his men most likely to be of help and who is not afraid to say to his chief, "That is Tom Brown's idea."

All my industrial, executive life, when occasion demands, I deliberately convey and encourage the idea that I am not so bright. It is a lazy way of getting good subordinates to do one's work and incidentally, it is good training for them and draws them out. When I thought there was room for improvement on any operation or job, I would jot down some rather elementary notes with rough sketches and send for old Andy to look them over and see about getting the scheme going. At our meeting I would explain what I wanted done and would make a faint show of having evolved something rather good, the while I noted his ill-concealed smile of compassion not unmixed with condescension. Timidly, pushing my notes and sketches across to him, I would plead pressure of work and suggest he look them over —"And in view of your wide experience, Andy, if you feel you can improve on this, please don't hesitate." His smile would broaden, I could almost hear the old scoundrel purring. Sure enough, the following morning I would find on my desk sheets and sheets all in his neat handwriting—the revised version down to the last comma. Heaven knows how many hours old Andy spent working hard at home in order to show me how dumb I was. When I was leaving for other fields, I wandered down to his office and as I murmured my thanks for all the help he had given me, I put a case with two briars on his desk. My hand was instantly crushed in his mighty paw and with eyes suspiciously moist he brushed past me mumbling something about having to see Ned Parker. I never saw him again, but some eight years later, on a bleak November day I covered the best of a hundred miles to pay my last respects to a rugged, incomprehensible old man who was so easily touched by a

"Look at this, will you! Somebody could get a lotta good wear out of them yet!"



IN ONLY 3½ DAYS

"PUTTIN'-ON-TOOL"

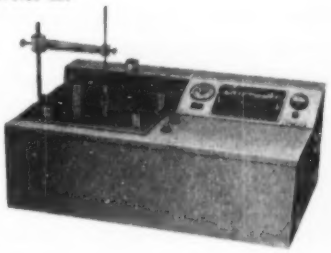
saves leading press manufacturer $2100 on spur gears

The bore diameter of flame-hardened precision gears like the one above used to be a costly problem for R. Hoe & Co., Inc., one of the leading manufacturers of large newspaper presses.

Constant orders for this particular gear, each specifying the bore diameter to extremely close tolerances, had to be met. Since manufacturing costs exceed $26.00 per gear, neither making up specials—nor annealing, reboring, and rehardening—was an economical solution. What HOE needed was a "puttin'-on-tool."

That's exactly what they have in their new Chromaster Industrial Chrome Plating Unit, which they use to adjust the bore diameter of stock gears to specification. Recently in a 3½ day period they were able to plate 81 of these gears with chrome deposits ranging from .0002" to .005" at a saving of $2100.

Chromaster can save you money, too. Write us.



CHROMASTER SALVAGES undersized parts, worn tools and gages right in your own shop. It's so simple to operate that no previous plating experience is needed. The chemically stable plating solution is deposited at a rate of .002" per hour for a cost of 7 mils per sq. in. One of six models will meet the requirements of every shop.

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Industrial Chrome Plating Units
20, 50, 250, 500 and 1000 amp. units

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The ability of Meehanite Metals to meet all of these service requirements is a result of *engineered* production; by means of rigid control of every manufacturing process used in casting production. Meehanite castings are available in four basic classifications—General Engineering, Heat, Wear and Corrosion Resisting —all available to solve your problems, reduce your costs.

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The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington and Dover, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, Calif.
Continental Gin Co.	Birmingham, Alabama
Crawford & Doherty Foundry Co.	Portland, Oregon
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
M. H. Detrick Co.	Newark, N. J. and Peoria, Ill.
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
Hardinge Manufacturing Co.	York, Pennsylvania
Johnstone Foundries Inc.	Grove City, Pennsylvania
Kanawha Manufacturing Co.	Charleston, West Virginia
Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
London Concrete Machy. Co. Ltd. (Hartley Fdry.)	Brantford, Ontario
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario
Palmyra Foundry Co., Inc.	Palmyra, New Jersey
The Prescott Company	Menominee, Mich.
The Henry Perkins Co.	Bridgewater, Massachusetts
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Warren Foundry & Pipe Corporation	Phillipsburg, New
Standard Foundry Co.	Worcester, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
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Sonith Industries, Inc.	Indianapolis, Ind
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Ross-Meehan Foundries	Chattanooga, Tennessee

"This advertisement sponsored by foundries listed above."

little well-merited appreciation. I sometimes wonder how we would have parted had I entered into competition with Andy in the know-it-all business. The executive who attempts to secure maximum production on know-all lines has much to learn.

M Donald
Lanarkshire, Scotland

NEW BOOKS

ELEMENTS OF HEAT TREATMENT. *By George M. Enos and William E. Fontaine. 286 pages. Published by John Wiley & Sons, Inc., 440 Fourth Ave, New York 16, N Y. Price, $5.*

Ordinarily, books on heat-treatment are dull heavy tomes or the author has skimped on the information a practical man really needs. But these two Purdue professors have done a masterly job in a book of reasonable length. What they have produced is a straight-forward series of paragraphs, into which they have packed needed information and left out involved technical explanations.

The book is therefore designed for the practical man:

Personnel in commercial plants who wish to know the principles behind heat-treatment without attending a formal course.

Mechanical engineers who want to review their college metallurgy on "materials courses" when faced with practical problems.

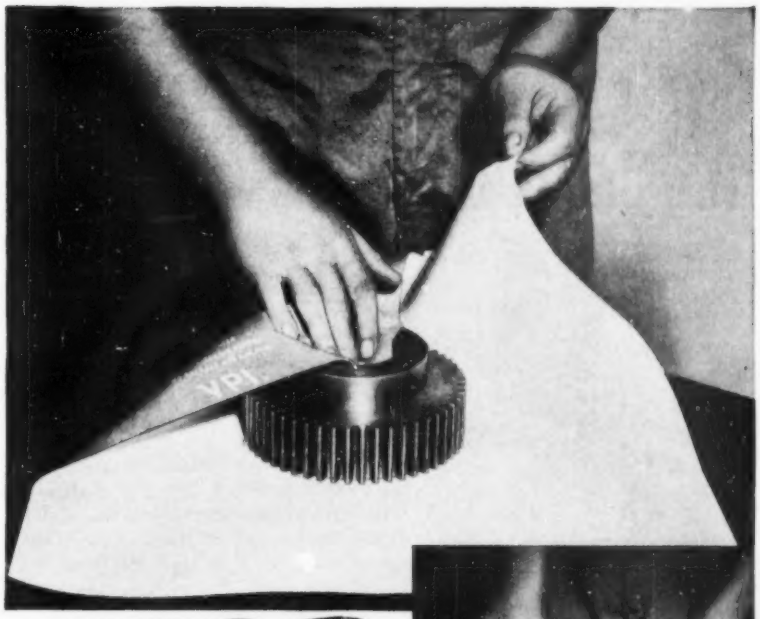
Design engineers who realize they must know about the why's of heat-treatment in order to choose metals for particular applications.

•

LA MACHINE-OUTIL (THE MACHINE TOOL). VOL 1 AND 4. *Published under the direction of A R Metral, president of the syndicate of mechanical and metal-working industries, by Dunod, 92 Rue Bonaparte, Paris, France. 336 pages. 8x11 in. Price 4400 francs Vol 1, 4600 francs Vol 4.*

Probably the most comprehensive work ever to appear on the general subject of machine tools, this series will form, when complete, a real encyclopedia of machining. There will be 8 volumes in all, of which Nos. 1 and 4 are now available.

The project originated with the National Conservatory of Arts and Trades and was under the direction of A R Mitrel, professor of mechanics



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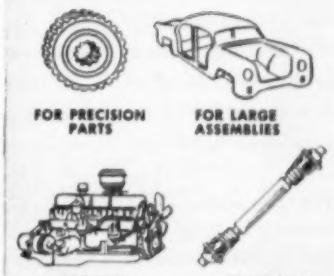

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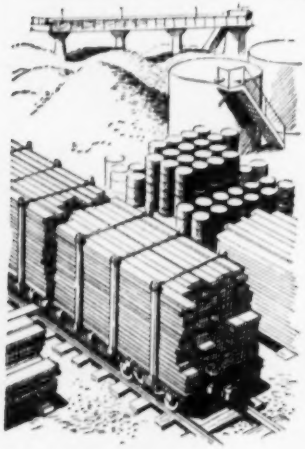
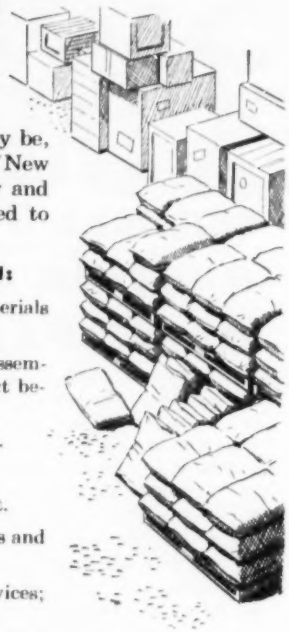
Raw materials were this plant's big location problem...



Finding a new location near basic raw materials—and within economical shipping distance of other supplies—is often a difficult task. Yet a manufacturer of jet engine components needing a site in the northeast market close to sources of nickel-alloy steel and lubricating oils had no trouble with this problem.

He got comprehensive information on the availability and cost of these raw materials at several desirable locations—within a short time—from the Industrial Location Service of the State of New York. With this data, it was easy for him to select the right location.

What's yours?



No matter what your location problems may be, the Industrial Location Service of the State of New York will be glad to get you, confidentially and without obligation, the information you need to solve them.

YOU CAN GET AUTHORITATIVE DATA ON:

Raw Materials: Cost and availability of all materials and supplies you may need.

Transportation: Availability of facilities, cost of assembling materials and distributing finished product between any given points.

Markets: Industrial and consumer market data.

Labor: Availability, skills and rates.

Power and Fuel: Character and cost at any point.

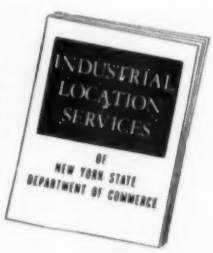
Available Buildings: Types, condition, facilities and terms. Confidential.

Sites: Availability, size, character, installed services; photos and maps. Confidential.

Community Services: A complete report on the facilities and attitudes of any community.

Laws and Regulations: Full data on laws or regulations applying to any particular form of enterprise.

FREE BROCHURE AND MAP. Send for "Industrial Location Services," a full description of the valuable, detailed plant location information New York State will obtain for you. A 1953 large-scale physical map of the state and adjacent areas, showing elevations, transportation systems, watersheds, etc., will also be sent to you. Write New York State Dept. of Commerce, Room 811, 112 State St., Albany 7, N. Y.



Industrial Location Service of

New York State

"WE DON'T SELL SITES—WE MATCH NEEDS"

at the Conservatory and at the national higher school of armament, and president of the syndicate of mechanical and metalworking industries. The various sections in each book were prepared by leading engineers, specialists in their own fields.

The purpose of the series is to show the best methods of using the various machine tools, including those for removing metal as chips, grinding machines, presses, and woodworking and plastics machines. For each type of machine there is presented a short history of its development, a detailed description of the design and mechanism, and the best and most modern methods of its application.

Vol 1 gives a history of machine tools in each of the major producing countries, and a review of the state of the industry, including imports and exports and volume of production. The technical section covers metallurgy in relation to machinability, design of castings, the study and application of cutting tools, cutting fluids, and machine-tool maintenance.

Vol 4 deals with machining by reciprocating tools and covers planers, shapers, slotters, and internal and external broaches.

It is to be regretted that these books are available only in the French language, as they form the most comprehensive treatise on machine tools ever to appear. Even with this drawback, however, they will form an invaluable addition to any library. To anyone with a working knowledge of French they make most interesting reading and are so copiously illustrated that they are quite easy to understand.

The other volumes will be reviewed as they appear.

DATA FOR X-RAY ANALYSIS—*By W Parrish and B W Irwin. Published by North American Philips Co, Inc, Research & Control Instruments Div, 750 S Fulton Ave, Mount Vernon, N Y. Vol 1, 100 pages, Vol 2, 84 pages. Price, $2.00 each.*

First volume of this three-volume series contains charts for solution of Bragg's equation. Charts cover K radiation for molybdenum, copper, cobalt, iron, and chromium. Also included is a table for converting minutes into decimals of a degree.

Volume 2 contains tables for computing the lattice constant of cubic crystals. Tables give K radiation values for the square root of N times the wavelength divided by 2, for copper, nickel, cobalt, iron, and

chromium. Also included are several other pertinent tables and a chart showing 33 representative cubic diffraction patterns.

Volume 3, now in production, will give X-ray reflection angles for several standard substances.

ENGINEERING METALLURGY (NEW FOURTH EDITION)—*By Bradley Stoughton, Allison Butts and Ardrey M Bounds. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, N Y. 479 pages. Price, $7.50*

Metallurgy has become so important in all branches of engineering that many books on the subject have been written. When "Engineering Metallurgy" was first published in 1926, it stood almost alone in its field. Now, three editions later, it represents nearly 30 years of experience in meeting the market with a satisfactory, up-to-date text for both engineering students and industrial readers. Many new developments in metallurgy since the third edition are covered. Among these subjects are: time, temperature, transformation curves, hardenability, induction hardening, metals for high-temperature service, and metals for atomic-energy development. Bibliographies have been greatly expanded to aid the reader in getting a well-rounded understanding of the present stage of engineering metallurgy.

•

PIPE AND TUBE BENDING—*By Paul B Schubert. Published by The Industrial Press, 148 Lafayette St, New York 13, NY. 183 pages, 6x9. Price $5.00*

This is a practical working manual describing all the common methods of bending ferrous and nonferrous pipe and tube. Machines, fixtures, and devices are shown, and there are useful data and pointers for shop and field use.

The first chapter describes each method and outlines its applications, pointing out its limitations and the way in which it differs from other methods. In subsequent chapters, each method is considered in detail, the various commercial machines are described, and the procedures for different types of bends are set forth.

A most useful chapter is devoted to pipe bend layout and gives the formulas for various degrees of bend, together with data on minimum bend radii. Information relating to filler material, mandrels, wooden dies, hot bending, and coiling is given, and there are many helpful tables.

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JOHNSON GRAPHITED CAST BRONZE SLEEVE BEARINGS were developed primarily for applications where lubrication is difficult or likely to be neglected. Another important use is where the shaft speed is too slow or the temperature too low to sustain an oil film; also where high operating temperatures may burn out oils and greases. They are recommended where lubricants might damage goods or foods in process, where dripping oil cannot be tolerated, and in certain underwater applications. Johnson Graphited Bearings are available in three types: with serrated grooves, with graphite plugs, and with graphite-filled oil grooves. The serrated type is a stock item in over 200 sizes, available through Johnson Distributors. Write for full information.
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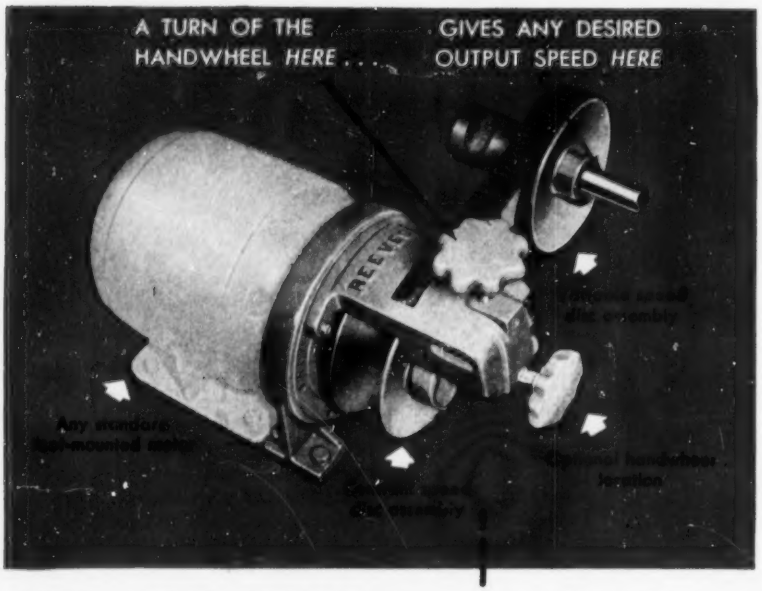
Flexi-Speed Drive

Mounts in any position . . . drives in any direction . . . gives any speed within 8:1 range. *Low Price!*



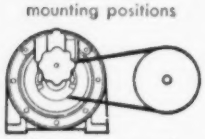
New REEVES Flexi-Speed Drive is the most versatile variable speed drive on the market today. Drives in any direction. Mounts in any position —above, below or beside the driven machine—practically without limitation. Speed control handwheel and driven shaft may be located anywhere around the motor shaft. Six different length belts offer a wide choice of shaft center distances.

For all these reasons, REEVES Flexi-Speed Drive is the easiest, most practical, and economical way of converting any constant speed motor to an infinitely variable speed drive *with 8:1 speed range*. May be used with any standard ball bearing, foot-mounted motor of ½, ¾ or 1 hp. Identical in working principle to the time-tested REEVES Motodrive, the Flexi-Speed Drive consists of constant speed disc assembly, variable speed disc assembly, double-cog belt and versatile shifting mechanism.

REEVES Flexi-Speed Drive is ideal for driving to standard gear reducers for parallel drive, on worm gear reducer for inexpensive right angle drive. Its versatility assures maximum production with the greatest efficiency and economy in your machines. Write today for complete details. Specify Dept. A90b-V532.

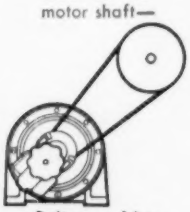
REEVES PULLEY COMPANY, COLUMBUS, INDIANA

Some of the mounting positions

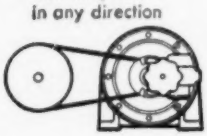


Handwheel control may be located anywhere

360° around motor shaft—



Belt may drive in any direction



NAMES in the NEWS

James B Duke has joined Elastic Stop Nut Corp, Union, NJ, as technical assistant to the general sales manager. He was formerly associated with the Hamilton Standard Div, United Aircraft Corp.

Richard H Berge has been advanced to the post of plant manager of Eaton Manufacturing Co's Pump Div, Marshall, Mich. Mr Berge, who joined the company in 1930, has most recently been serving as assistant to the manager.

Robert G Dobbin has joined the commercial motor section of Jack & Heintz, Cleveland, as design engineer. The appointment is in line with the company's expanded program for output of fractional-horsepower motors. Mr Dobbin was associated with General Electric Co for ten years as designer of these motors, and most recently has been acting as motor consultant for International GE at Schenectady, and in Brazil.

J Joseph Smith has been appointed manager of plant facilities for American Locomotive Co; his post as manager of the locomotive division plant in Schenectady is being taken over by **Wallace H Allison,** former general superintendent. **W L Larson,** manager of the ordnance division plant, has been named general plant manager of the Dunkirk, NY, and Beaumont, Texas, plants. **Robert A Controy,** ordnance division production manager, succeeds Mr Larson as plant manager. **E N Cooley,** on temporary assignment as assistant to the president at Dunkirk, NY, for the past year, has been named administrative assistant to the president with Schenectady headquarters. **William H Clark,** general purchasing agent, has been appointed company consultant on procurement activities. **E J Van Valkenburg,** director of procurement for the ordnance division, has been appointed director of company procurement. **James T Lewis,** manager of quality control, has been named consultant in this field, and **E N Boswell,** chief inspector of the locomotive division, will direct quality control. **George C Paddock** is new purchasing agent for the locomotive division plant, and **Thomas S Devoy** purchasing agent for ordnance. **E R McClung,** general

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TO
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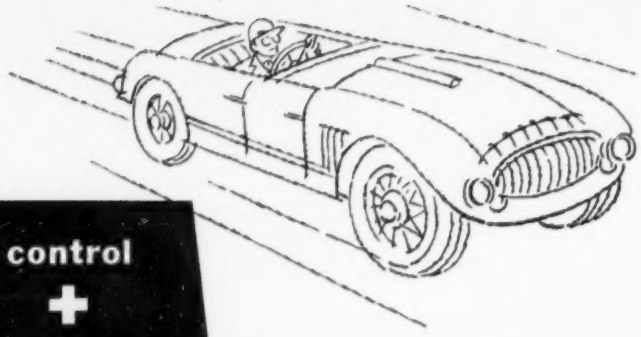
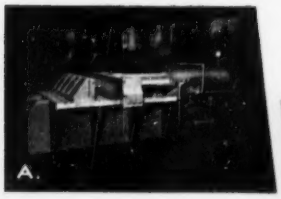


control + speed

Hand-crafted sports cars are precision-built to hug the curves — take any road conditions — to provide the ultimate in control, speed and safety. Like these prima-donnas of the highways, BEATTY machines are constructed on precise tolerances to afford the same kind of exact control, speed and safety in industrial metal fabricating. One of the machines illustrated can be modified to suit your particular problem. Or, let our engineers recommend, design and build one to your exact requirements.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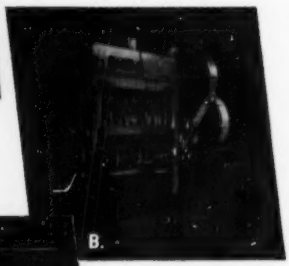
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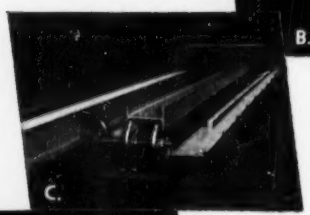

C.

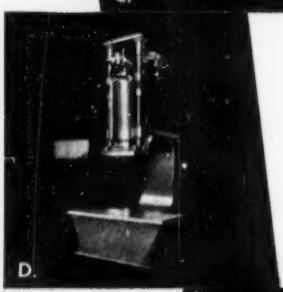
A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.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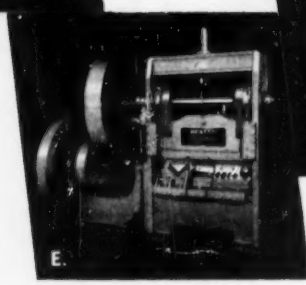

E.

BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA

superintendent of ordnance division, is new assistant plant manager; **C R Dockstader,** staff assistant to the plant manager, is personnel director, in addition to his other duties. **W A Kuder,** assistant superintendent of ordnance division, is new superintendent of production. **Frank J Klose,** second shift general plant foreman for the locomotive division, has been named chief inspector.

S David Tyler has been named assistant general manager of Eaton Manufacturing Co's Foundry Div, Vassar, Mich. **Paul W Olson** has been appointed resident manager, **Howard R Johnson,** factory manager, **Ralph F Evert,** assistant sales manager, and **Daniel J Schindehette,** plant controller.

Seward H French, Jr, has been named vice president in charge of industrial and public relations of Crucible Steel Co of America, Pittsburgh. He joined the company in 1947 as assistant to the president, in charge of this field.

Dr Harry A Schwartz, for many years manager of research for National Malleable & Steel Castings Co, Cleveland, and one of the country's leading malleable iron metallurgists, is retiring from full-time work Sept 15. His services will be available to the company in the newly-created position of assistant to the vice president in charge of production. **B C Yearley,** assistant manager of the company's Chicago works, will be transferred to Cleveland as director of applied research, process control, and supervisory training.

Joseph M Halloran has been appointed sales representative covering the New England territory for Ajax Engineering Corp, Trenton, NJ. He will handle the company's line of low-frequency induction furnaces.

"A brilliant production innovation, Potter! I only wish you were in Sales so we could get through a raise for you."

Brig Gen Merle Halsey Davis, who retired in August as chief of the Army Ordnance Industrial Ammunition Branch, has become mfg & engrg consultant for Clary Multiplier Corp. He will work with production operations, including business machines and electronic equipment as well as guided-missile instruments and ammunition components, at the San Gabriel, Calif, plant. The firm has announced a new $6 million program for guided-missiles instruments and is expanding production of its other lines.

R V Krikorian has been appointed manager of Chain Belt Co's Ordnance Div. He joined the firm three years ago; prior to his promotion he served as assistant in the division he now heads.

Gerald H Howell has been elected vice president and general manager of Garfield Manufacturing Co, Garfield, NJ, manufacturers of coid molded and allied products.

Robert S Sagers has been named manager of Kennametal's New England district. He was formerly service and sales representative in the Middle Atlantic district.

Louis Reiss has been elected treasurer of Niles-Bement-Pond Co, West Hartford, Conn. He will take over duties formerly held by Vice President **Richard W Banfield,** who will devote full time to managing the company's small tool and gage divisions.

Charles E St Thomas has been named advertising and sales promotion manager of General Electric Co's Carboloy Dept. He moves into the post formerly held by **E C Howell,** who died recently.

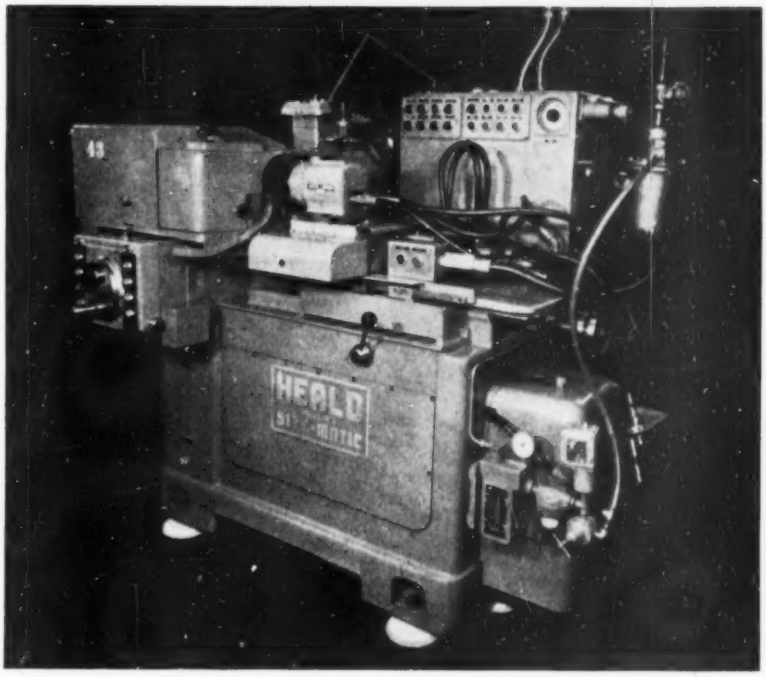
H J Enders, vice president of the Permatex Co, Brooklyn, will head the newly-established special industrial sealants division of the maintenance chemical company.

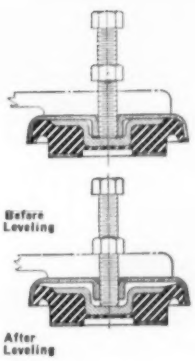
Howard L Farrow has been appointed plant manager of the Arthur C Withrow Co, Los Angeles developers of specialty lubricants. He has been serving as lubricants research supervisor for Richfield Oil Corp for the past 10 years.

Dorward C Witzke has joined the Cleveland Graphite Bronze Co as assistant to the president. Prior to his appointment, he served as general manager of Continental Can's Plastics Div at Cambridge, Ohio.

Protect the Accuracy of Your Machines with these

NEW *leveling* BARRYMOUNTS





When chatter marks spoil your finishes, vibration from an outside source may be to blame. It may come from punch presses in another part of your plant, or it may come from passing traffic or from heavy machinery next door.

But building-borne vibration can't destroy the accuracy of your grinders if you set them on the new Leveling Barrymounts.

They isolate your precision grinders from building-borne vibrations that can cause chatter marks.

They absorb vibrations that destroy precise machine adjustments.

They keep shock and vibration from causing inconsistent operation of delicate controls.

Barrymounts cut your costs

by stopping spoilage due to vibration. They're low in cost—and backed by a money-back performance guarantee. Just tell us the make and model of your grinders and we'll tell you how to protect their precision. And write for bulletin showing the additional advantages of these cost-cutting Leveling Barrymounts.

THE **BARRY** CORP.

703 PLEASANT ST., WATERTOWN 72, MASSACHUSETTS

SALES REPRESENTATIVES IN

Atlanta Baltimore Chicago Cleveland Dallas Dayton Detroit Los Angeles Minneapolis New York Philadelphia Phoenix Rochester St. Louis San Francisco Seattle Toronto Washington

WHY WE SPECIFY

LUFKIN LEVELS . . .

No. 59 MASTER PRECISION LEVEL

FOR EXTRA ACCURACY — Special alloy base is less affected by temperature changes. Accurately ground and graduated vial of 10 second accuracy, one division equalling .0005 of an inch per foot. Fine, positive adjustment with extra sensitive (64 threads per inch) screws. Auxiliary level shows lateral position. 15" length.

FOR EXTRA DURABILITY — Design gives maximum protection to vials. Top plate made of special non-conductive insulating material. Made from thoroughly seasoned castings. Machined surfaces scraped with extreme care. Non-machined surfaces have durable black crackle finish.

No. 57 & 58 MACHINISTS LEVELS

The shallow "V" in the base of Lufkin Machinists Levels No. 57 and 58 is preferred by mechanics and tool setters because better contact is obtained on shafting. The main vial on No. 58 is graduated with each graduation equal to .005 inches per foot. The vial on No. 57 is plain. Micrometer type thread permits fine adjusting. Outer metal tube can be turned to protect main vial when not in use. Made in 6", 8", 12" and 18" lengths.

WRITE TODAY FOR NEW TOOLS BOOKLET DESCRIBING LUFKIN LEVELS

BUY LUFKIN TAPES • RULES • PRECISION TOOLS From Your Distributor

275

THE LUFKIN RULE CO., SAGINAW, MICHIGAN
132-138 Lafayette St., New York City • Barrie, Ontario

Guy Pitts, formerly plant manager of Bohn Aluminum & Brass Corp's plants No. 5 and 8, has been appointed division manager of the company's Brass & Bronze Div, which includes Forging Plant No. 5, Brass Mill Plant No. 8, and the Michigan Smelting & Refining Div. **Frank Turnbull** has been named buyer of scrap material for the Michigan division.

Ronald N Campbell has been named assistant to the president of Affiliated Gas Equipment, Cleveland. In his new post Mr Campbell will devote himself to the coordination and planning of the company's production, including the Bryant Heater, Payne, and Day & Night Divs. He most recently served as vice president in charge of manufacturing for Landers, Frary & Clark, New Britain, Conn; prior to that he was assistant works manager of Carrier Corp's Syracuse, NY, operations.

James E Woodall has been named to the newly-created post of manager of manufacturing, Westinghouse Lamp Div, Bloomfield, NJ. Mr Woodall, formerly a division staff assistant, will coordinate parts fabrication with finished production, and guide machine designers in the development of manufacturing equipment. **William J Williams,** formerly manager of parts plant, will take over a second new post, that of manager of manufacturing engineering. **Elwood W Noxon,** previously manager of southern plants, has been appointed manager of northern operations at Trenton, Bloomfield, and Belleville, NJ. **Charles T Nichols,** former manager of the Reform, Ala, plant, will be responsible for the Little Rock, Reform, and Richmond, Ky, plants, as well as the parts plant at Paris, Tex.

C H Menge, vice president of The Murray Corp of America, has been elected executive vice president of the Eljer Co, a subsidiary. Mr Murray, who has been in charge of sales for Murray's Home Appliance Div, will assume direct responsibility for all Eljer operations and sales. **T W Hardy,** vice president in charge of the Home Appliance Div, will take over sales activities in addition to his present duties.

Earl J Boyer has joined Sheffield Corp of Dayton, Ohio, as application engineer for Measuray, the non-contact X-ray gage for continuous or intermittent measurements of strip or sheet stock while in motion or stationary. Mr Boyer has been a member of the Frigidaire organization for the past twenty years.

NEW! BAY STATE BZ SAF-T-CUT

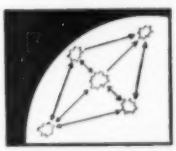
... A TRULY GREAT REINFORCED CUT-OFF WHEEL

REINFORCED CUT-OFF WHEEL
BZ SAF-T-CUT

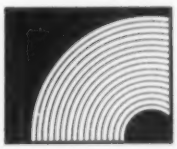
- GREATER SAFETY
- GREATER COOLNESS
- GREATER LIFE (10 TO 20%)
- GREATER STRENGTH (100%)
- GREATER CUTTING SPEED (UP 20%)
- GREATER RESISTANCE TO LOADING

ACTUAL TESTS PROVE THAT BZ SAF-T-CUT WHEELS ARE... STRONGER... FASTER... COOLER

Reinforced with tough glass fiber for rugged STRENGTH and LONG LIFE.



New "BZ" Bond holds abrasive particles exactly right for OPTIMUM CUTTING POWER.



New Spiral Grooved sides give COOLER, CLEANER CUTTING on the 14" to 20" dia. sizes.

Micro photo shows "air-cooling" groove design that adds NON-BURNING feature.

BAY STATE

Available in Aluminum Oxide abrasive (for cutting metals), and Silicon Carbide abrasive (for cutting non-metallic materials). Call in your BAY STATE REPRESENTATIVE for details, or write for size and specification data.

Development of the new "BZ" bond was aimed at improving safety, cutting rate, and wheel life for all cut-off work on steel bars, pipe, angle iron and other structural shapes, as well as ferrous and non-ferrous castings.

Actual tests show fast, clean cuts on these materials, plus performance records of 10 to 20% better life... and up to 20% faster cutting rate than the best competition.

BAY STATE says to its sales force and to you, "We believe this 'BZ' SAF-T-CUT wheel to be the best reinforced resinoid cut-off wheel on the market today, from every point of view". Ask for a demonstration.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses: Chicago, Cleveland, Detroit, Pittsburgh

Distributors — All Principal Cities

In Canada: Bay State Abrasive Products Co. (Canada) Ltd. Brantford, Ont.

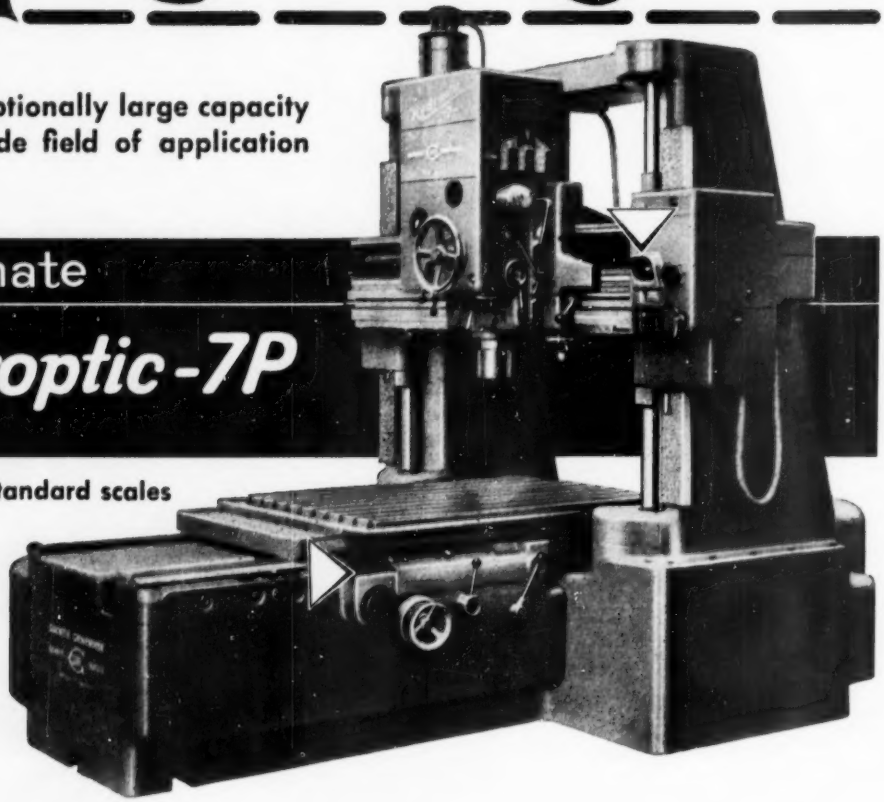
SIP Jig Boring and

of exceptionally large capacity
and wide field of application

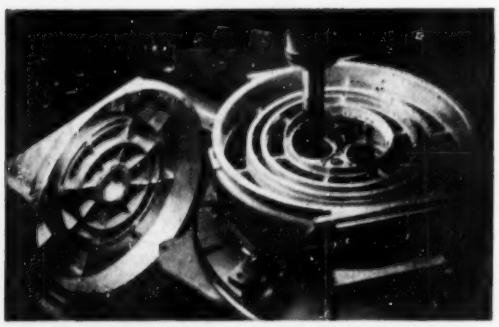
2 coordinate

Hydroptic-7P

with built-in standard scales



settings
on projection
screens

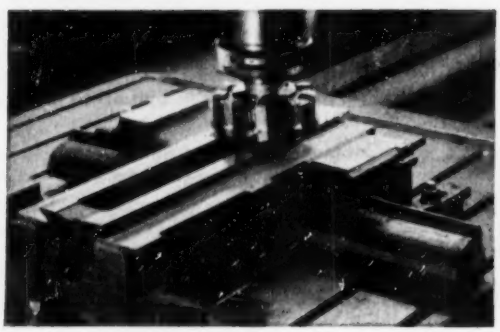


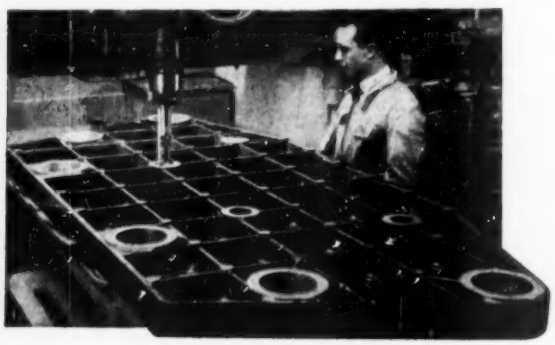
This jig borer of exceptionally wide capacity incorporates built-in standard scales ensuring the high and permanent accuracy of all coordinate settings of the work-table and spindle head. These settings are made in the most simple manner by means of viewing screens on which the division of the scales is projected at a large magnification. Strong and rigid design permits heavy duty work to be handled at fast rates of production.

Guaranteed setting accuracy: .0002 in.

SPECIFICATION

Working range	55 in. × 40 in.	Vertical spindle speeds	40 to 2000 r.p.m.
Distance between uprights	63 in.	Spindle quill travel	12 in.
		Net weight of machine	12 tons





Alo

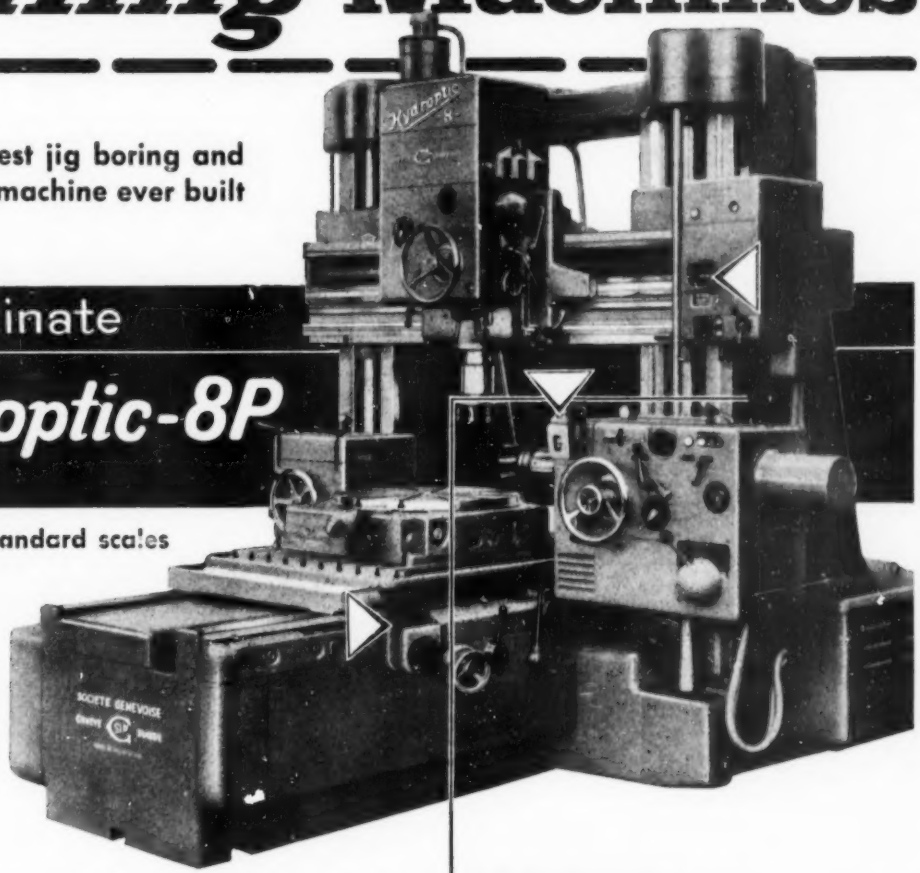
Milling Machines

the largest jig boring and milling machine ever built

3 coordinate *Hydroptic-8P*

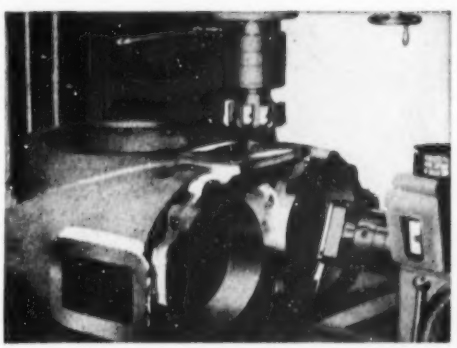
with built-in standard scales

settings on projection screens



Equipped with the same work-table and vertical spindle head as the Hydroptic-7P, this machine is, in addition, provided with a powerful horizontal spindle head the vertical coordinate settings of which are also made on a built-in **standard scale** by means of a projection screen. It is thus possible, in conjunction with the large "Rotoptic" Circular Table, to machine successively and **at one set-up** all lateral faces of a workpiece, or to bore radial holes all around its circumference. Long holes of large diameter are machined, using strong boring bars guided in an outboard-bearing supplied with optical aligning device.

Guaranteed setting accuracy: .0002 in.



SPECIFICATION

Table longitudinal travel	55 in.	Vertical spindle speeds (18)	40 to 2000 r.p.m.
Vertical spindle head travel	40 in.	Horizontal spindle speeds (25)	40 to 1000 r.p.m.
Horizontal spindle head travel	28½ in.	Spindle quill travel (both spindles)	12 in.
Distance between uprights	57 in.	Net weight of machine	17 tons

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AMERICAN SIP CORPORATION

HIGH PRECISION MACHINE TOOLS AND MEASURING EQUIPMENT

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HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION

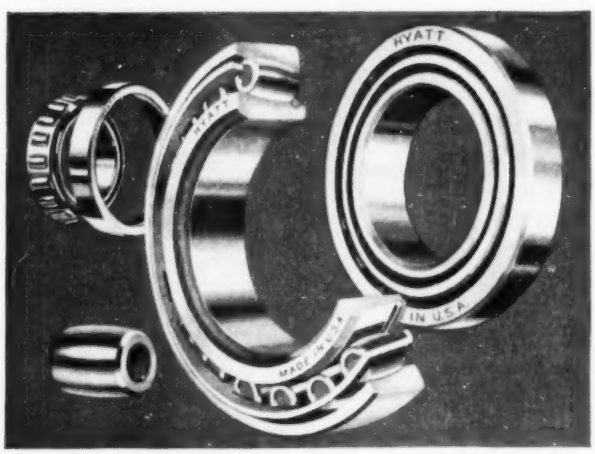
YATT BARREL BEARING

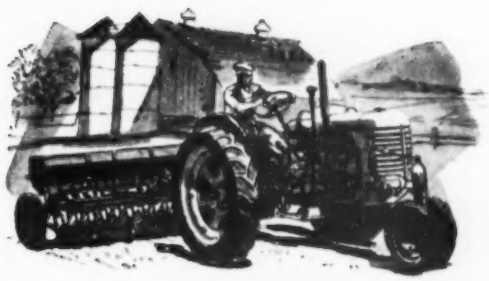
now available in volume!

Hyatt is rolling out the barrels! . . . and a familiar shape is giving a big lift to modern industry! A new Barrel Bearing —pioneered and perfected by Hyatt—is available in volume for the first time! There's no other bearing quite like it—and it's ready for a starring role in industrial production!

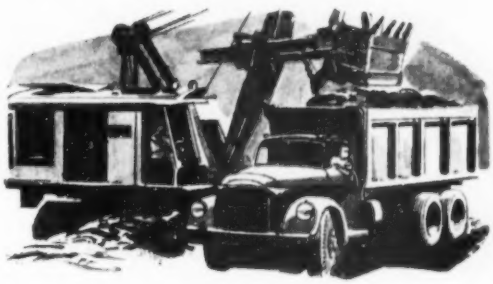
The Barrel name comes from the barrel shape of the rollers . . . but its superiority in bearing applications comes from *dual-purpose design* and *self-aligning ability!* This unique bearing takes load from any direction . . . and operates at full load-carrying capacity under conditions of misalignment! And in addition, the barrel shape of the rollers combines the low rolling friction of a ball with the high load capacity of a cylindrical roller—so that the Barrel Bearing is ideal for a wide range of applications.

Expensive? *Not at all!* Advanced manufacturing processes —plus the facilities of one of the newest and finest bearing plants in the world—make the initial cost far lower than you would expect! . . . For full information on this newest solution to the friction problem, write to the address below.

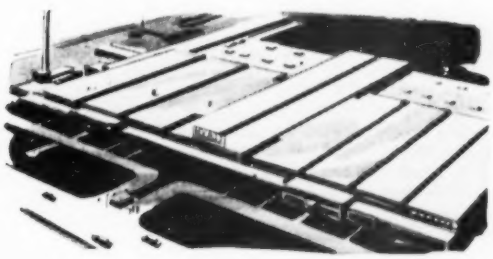




Self-aligning action makes the Barrel Bearing ideal for tractors and farm implements. Over many years, its durable, dependable performance has been established in a wide range of these applications.



In trucks and construction equipment, too, Hyatt's Barrel Bearing operates with full efficiency under conditions of heavy, multiple-direction loading. Unique roller and race design distributes the load over large areas of contact.



Hyatt's new plant, in Clark Township, N. J., is among the most modern in the world. New equipment makes possible advanced manufacturing processes, and research facilities are the finest in the bearing industry.

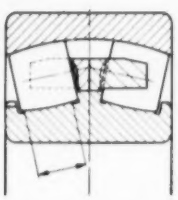
YATT **ROLLER BEARINGS**

HARRISON, NEW JERSEY

the SKF improvement of internal design of spherical roller bearings

Increases capacity 25% to 50%

increases service life 2 to 3½ times

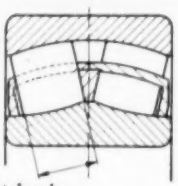


This is the Spherical Roller Bearing design originated by SKF *more than 30 years ago.* The cross-section shows how the integral inner ring flanges, and the undercuts adjacent thereto, limit the effective length of the rollers.

Now, SKF, originator of the Spherical Roller Bearing, has again provided industry with another anti-friction *first.*

This time, it's a revolutionary design advance in Series 222 and 223 bearings providing these advantages:

When designing new equipment, you can obtain the desired life by using smaller or lighter bearings at considerable cost saving. In addition, this forward step in design will carry heavier combinations of radial and thrust loads, or pure thrust loads of greater magnitude. The important self-aligning feature of SKF Spherical Roller Bearings has been preserved, so that considerable misalignment between the shaft and housing has no ill effect whatever on bearing capacity or life.



Here is the latest SKF improvement, a *revolutionary advance in design.* Effective roller guiding is accomplished by means of a separate ring. The need for undercuts is eliminated! This type of guide ring permits the rollers to take the position which their contact with the rings dictates. This assures uniform load distribution over the entire length of the longer rollers at all times. *Result*—greatly increased capacity and life.

During more than 4 years, thousands of installations have been made in railroad journals, vibrating screens, steel mill machinery and numerous other fields. In all cases performance has been outstanding.

SKF Sales Engineers in our District Offices throughout the country will assist you in making use of the important advantages of the improved internal design of SKF Spherical Roller Bearings. **SKF INDUSTRIES, INC.,** Dept. 616, PHILADELPHIA 32, PA.
— *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*

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SKF®
BALL AND ROLLER BEARINGS

This 12-page booklet gives you additional facts—sizes available—added capacity, size by size—increased life you can expect for each size—dimensional tabulations—and load and speed data. Write now for your free copy of Booklet No. 365-2.

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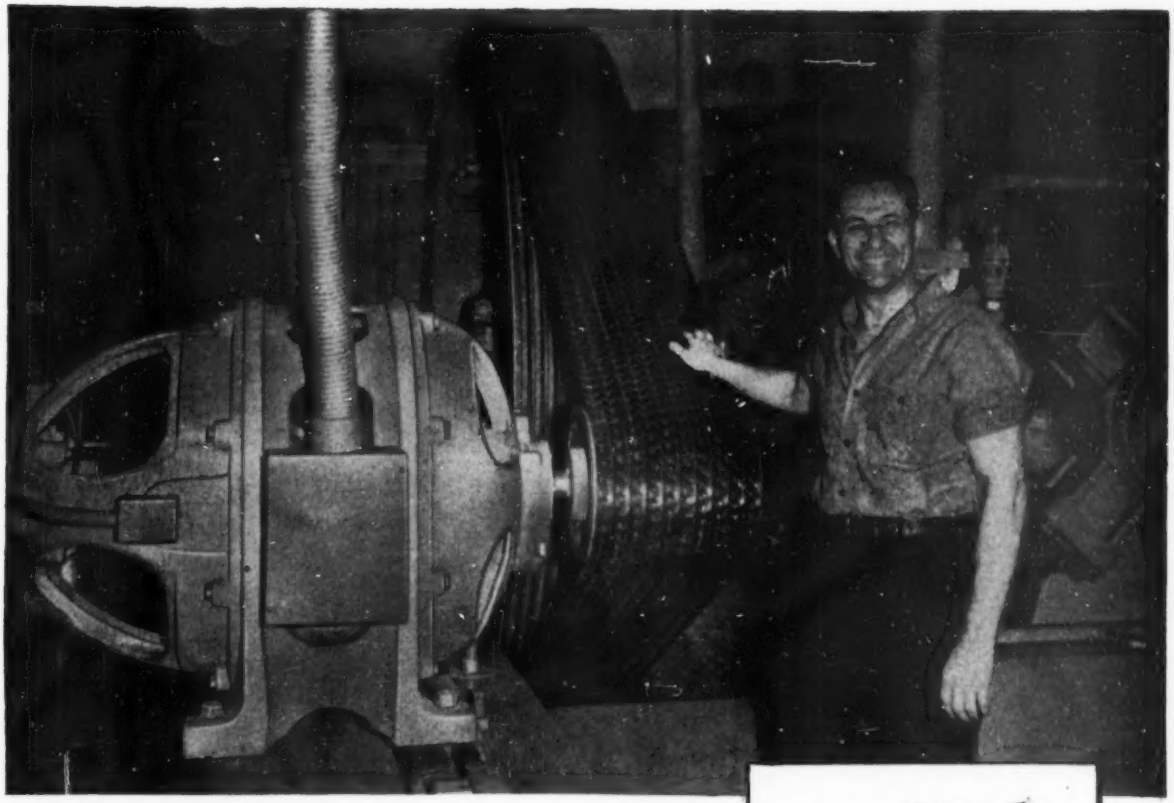

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v-belt replacement takes up to 90% less time

Actual in-plant records prove that Veelos v-belt can be installed *and operating* in up to 1/10th the time regularly needed to do the same job using endless v-belts.

Matched sets of Veelos are quickly made up in your own stockroom or at the machine by just coupling the correct lengths for the particular drive. Even outboard bearing drives are no problem. You *never* remove these outboard bearings, because Veelos is installed by simply coupling it around the shafts and running it onto the sheaves. And maintaining adequate stocks of Veelos is practically automatic. A quick check of the Veelos 100-foot reel will tell the inventory story.

For full vibrationless power delivery, for fast adjustability to keep sets matched, for ease of controlling inventory and for quick, simplified replacement — standardize on Veelos.

Have you seen this Veelos Facts Book?

Your Veelos v-belt distributor's salesman will be glad to give you a quick trip through this fact-packed, 36 page book. You'll find it well worth the few minutes it takes. Next time the salesman calls, ask him to show it to you.

VEELOS
THE LINK
V-BELT

Write for a copy of the VEELOS DATA BOOK. It's fully illustrated and packed with useful engineering data. We'll be glad to send a copy along and you'll be glad to have it!

MANHEIM MANUFACTURING AND BELTING COMPANY
601 Manbel St., Manheim, Pa.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

WANT TO REDUCE COSTS PER PIECE?

FROSTRODE removes excess heat from the coolant!

Frostrode Coolant Coolers Will Give You–

- LONGER TOOL LIFE WITH LESS MAINTENANCE
- IMPROVED SURFACE FINISH
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- REDUCTION OF REJECTS

Users of Frostrode Coolant Coolers have recorded amazing increases in efficiency.

"If you can pump it FROSTRODE can cool it"

Write for examples of FROSTRODE installations applied to machine tools–BULLETIN 502

FROSTRODE® DIVISION OF VIKING PRODUCTS

3066 EAST OUTER DRIVE • DETROIT 34, MICHIGAN

All power trucks lift, move and stack

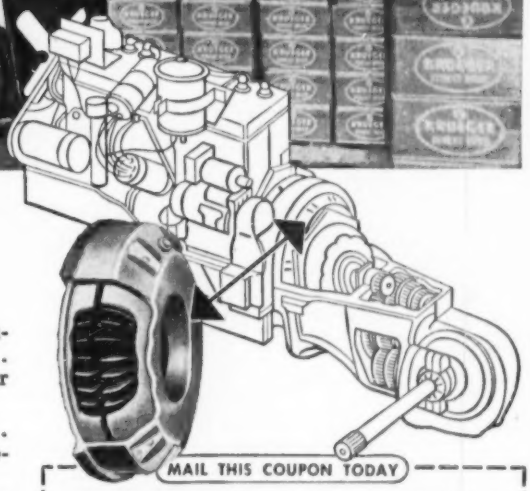
BUT ONLY YALE GAS TRUCKS HAVE FLUID DRIVE

Smooth, trouble-free Fluid Drive gives you 3 to 8 times longer clutch life... saves costly, work-stopping clutch repair and too-frequent replacement.

Less down time is just one of the big advantages of Yale-exclusive Fluid Drive. You get continuous, stall-free operation... smoother stops and starts to protect your load as well as your operator.

Other Yale Gas Truck features... many of them exclusive... include rugged 65 HP Industrial Engine—safer, surer Automotive-type Brakes—Shockless Steering—Hypoid Gears.

Yes, YALE Trucks and attachments lead in money-saving efficiency... cut costs as much as 75% in industries everywhere. And, every Truck YALE makes... Gas, Electric, Diesel, LP-Gas or Gas-Electric... is subject to rigid Quality-Control checks at every stage of manufacture.



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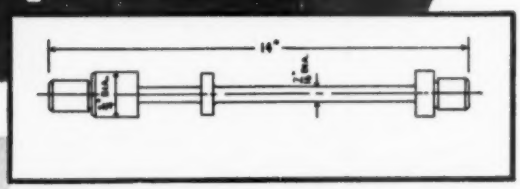
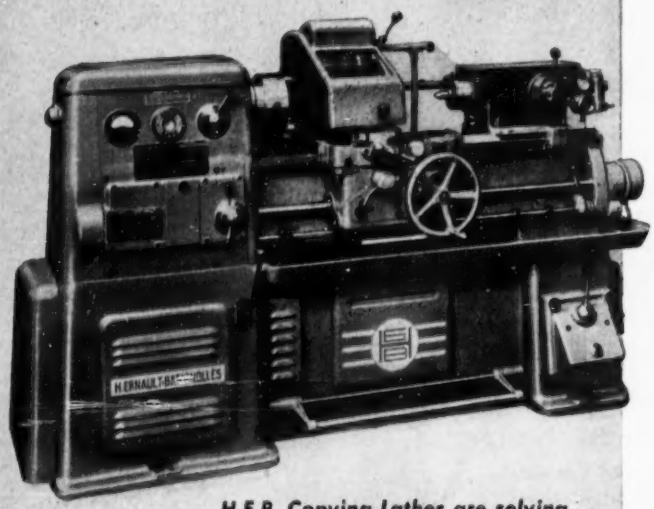
Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

Got a tough turning problem?



HIGH SPEED HYDRAULIC Copying Lathes

will show you how easy it can be!



- **Slash production time**
- **Produce better finish and closer tolerances**

We'd like to make your troublesome jobs easy. *SEND US A PRINT OF YOUR MOST DIFFICULT TURNING JOB* for analysis by our engineering staff! We think we can prove to you that the H.E.B. is *"The* Way to Turn!" There's no charge or obligation, of course.

That spindle you see in the drawing has actually been *copy*-turned on the H.E.B. in just 2.1 minutes floor-to-floor time, machined from SAE 1040 . . . and every copy-turned part is identical.

The new H.E.B. fully automatic copying lathes with motors up to 60 H.P. are the most economical way to turn high production bar and chucking jobs. The **OP** Models offer fast machining even when lots are as few as half a dozen pieces. **GT** Models copy-turn molds and irregular work.

Ask for a demonstration now or for detailed literature—Study our insert in Sweet's Machine Tool catalog!

H.E.B. Copying Lathes are solving turning problems in these plants:

- Acromatic Tool Company
- Beaver Precision Products, Inc.
- Buick Division, General Motors Corp.
- De Laval Separator Co.
- East Coast Aeronautics, Inc.
- Electrol, Inc.
- Fox River Ordnance Plant
- Harvey Machine Tool Company
- Manufacturers Tool & Gauge Co.

. . . AND MANY OTHERS!

IMMEDIATE DELIVERY

H·E·B

"THE WAY TO TURN"

H.E.B. MACHINE TOOLS, INC.

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Certain exclusive sales territories are still open.

COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • TOOL ROOM LATHES • CARBIDE TOOL GRINDERS

A MOVABLE HORIZONTAL SURFACE for YOU

. . . . . REMOVE

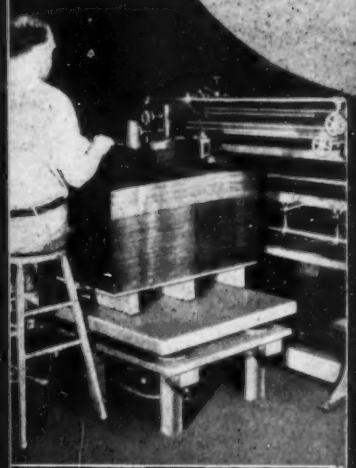
UP

PORTELVATOR®

(The Handy Hamilton Portable Elevating Table)

DOWN

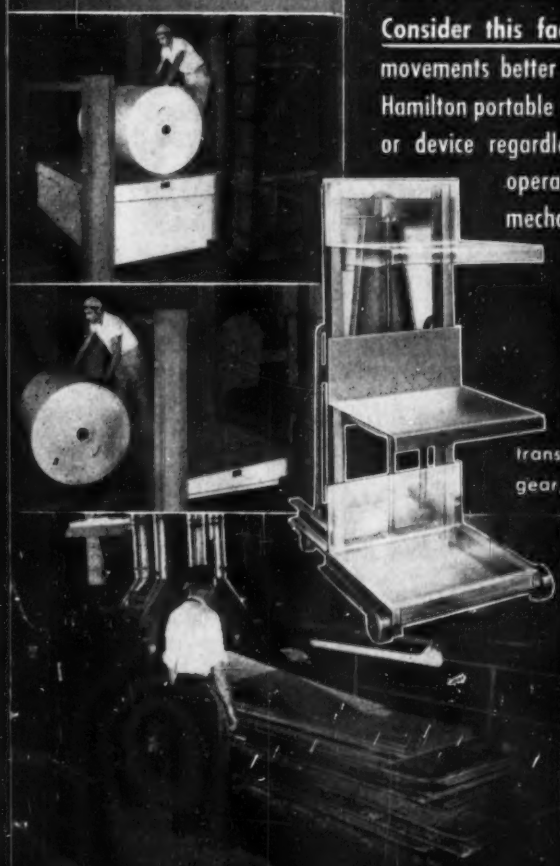
FETCH . . . . .

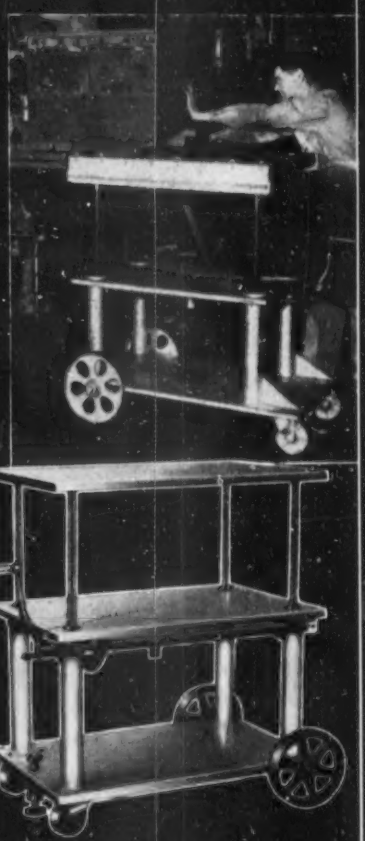


● **In hundreds of spots** throughout your operation you are required to lift or lower, take or fetch. Tools and dies must move from storage to machine—from machine to storage. Materials must be positioned. Machines must be fed.

Consider this fact! You can accomplish many industrial movements better and cheaper with Portelvator, the handy Hamilton portable elevating table, than with any other means or device regardless of cost. Take another look at your operation, then take a look at the exclusive mechanical lift principle which is employed in all Portelvator applications. Write for free bulletin P-5309.

●





Portelvator® employs an exclusive mechanical lift principle based upon power transmission through meshing worm, worm gear, and screw. Load capacities to 20 tons. Stationary or portable. Power operated or manual. Push button controlled or completely automatic. Vertical movement to 10 ft. Table sizes to suit requirements. Tilt tops. Flat tops. Roller tops. — Take another look at your operation . . . and at Portelvator. Write now!

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Consistent accuracy to the highest degree ... at a Remarkably Low Price!

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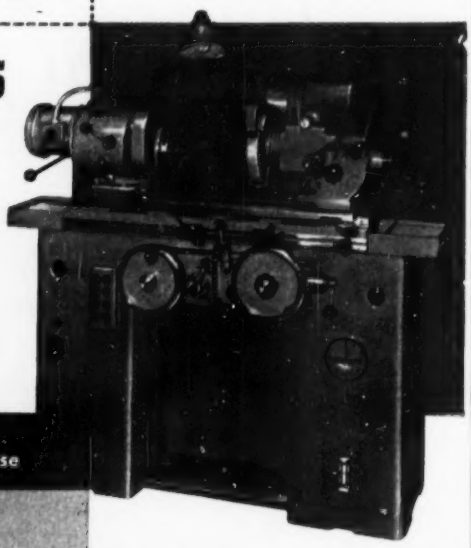
HYDRAULIC

Universal
(Internal & External)
Cylindrical Grinders
10" x 15"
also 10" x 20"



For Tool Room and Production Use

- Rigid construction.
- Easy to operate.
- Service and parts available.
- Reference installations at many leading plants.
- Minimum infeed .00005" per reversal.
- Two week delivery.
- Ultra accurate on roundness and surface finish.

Max. wheel size	10" x 3" x 1¾"
Hydraulic table speed	Infinitely variable
Headstock spindle	Variable
Collet capacity	¾"
Internal grinding spindles	16,000 to 55,000 RPM

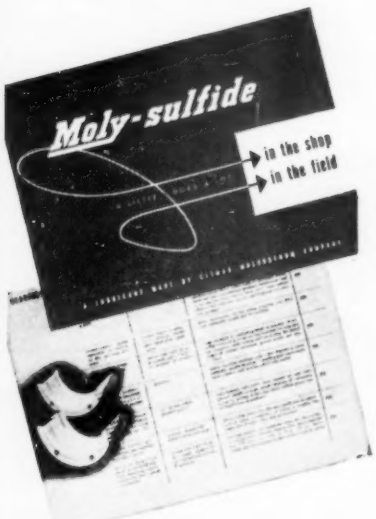
Dealerships are available in certain localities.
Write for proposal now!

COLUMBIA EXPORT COMPANY, INC.
Machine Tools Division
10-35 44th Drive · Long Island City 1, N.Y. · STillwell 4-1546

From the *American Machinist* Library of *Tips for Top Shop Men*

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

154 ideas on ways to use...



154 varied applications of molybdenum sulfide in the shop and in the field are described in a new booklet now available. This solid-film lubricant has demonstrated unique anti-friction properties under conditions of extreme pressure, high velocity, elevated temperature, or chemical attack.

The 40-page booklet contains the records of solved lubrication problems — some might solve your own.

Moly-sulfide
A LITTLE DOES A LOT

The lubricant for extreme conditions

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Please send me your Free Booklet on *Moly-sulfide*
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A.M.—10 MS-6A

U. S. DRILL HEAD COMPANY SAYS . . .

HEAT TREATING ELIMINATED

•REJECTIONS REDUCED

•WEARABILITY INCREASED AND

COSTS CUT 50%

WITH

STRESSPROOF®

SEVERELY COLD-WORKED, FURNACE-TREATED STEEL BARS

Multiple spindle, made by U.S. Drill Head Company, Cincinnati, Ohio, uses spindles made from STRESSPROOF.

• Spindles for these multiple drill-heads must be straight. Formerly heat-treated, straightening was a difficult, costly job, and rejections were high.

Now produced from STRESSPROOF, heat-treating, with its attendant straightening problem, is eliminated; machinability is increased 25%; wearing properties have been improved; and costs reduced 50%.

STRESSPROOF makes a better part at a lower cost.

STRESSPROOF's value to manufacturers like U.S. Drill Head stems from its unique combination of four qualities in the bar: (1) Strength, (2) Wearability, (3) Machinability, and (4) Minimum Warpage. Yet STRESSPROOF costs less than other quality cold-finished steel bars. It comes in cold-drawn or ground and polished finish.

SEND FOR . . .
Free Engineering Bulletin "New Economies in the Use of Steel Bars"

La Salle **STEEL CO.**

Manufacturers of the Most Complete Line of Carbon and Alloy Cold-Finished and Ground and Polished Steel Bars in America.

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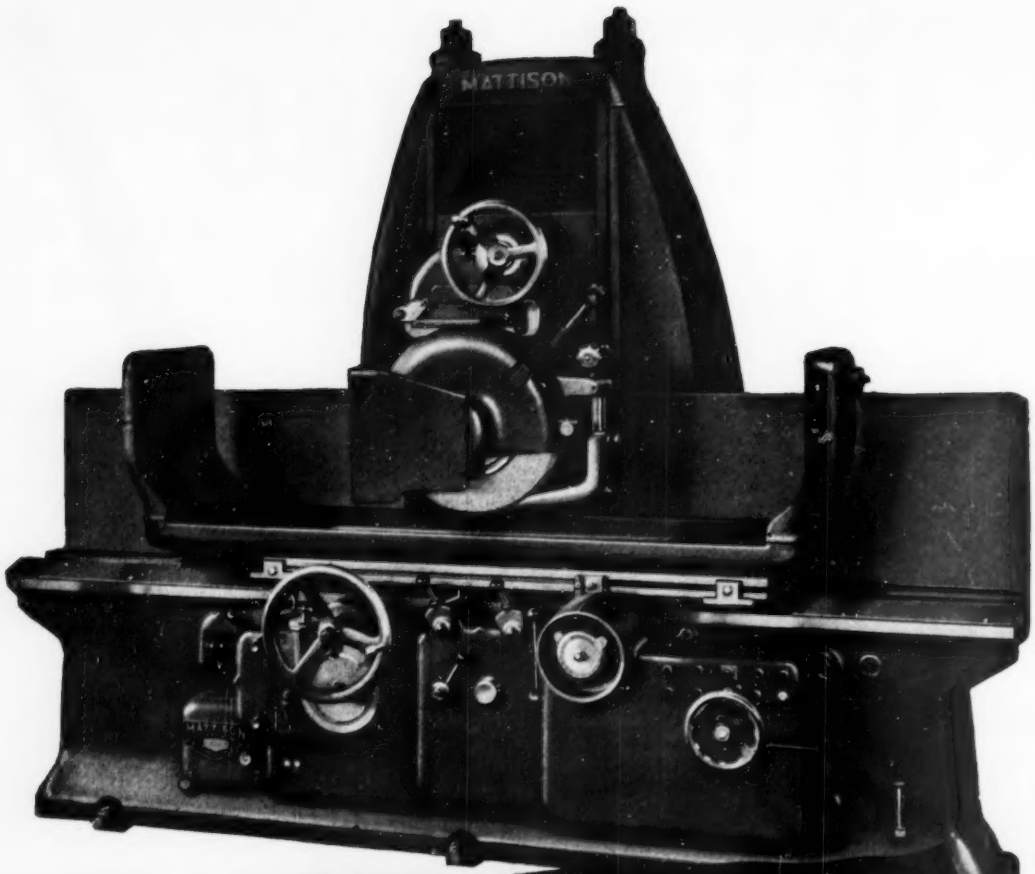
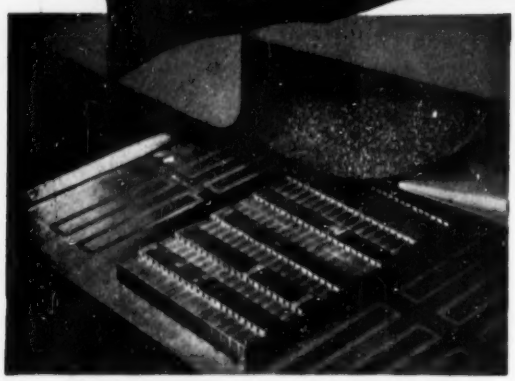


HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production — 30 per hour.

● Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example — the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder — 30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS

Half mile of HELIARC TRADE MARK welds OK'D by rigid X-ray tests

A midwest manufacturer was faced with the problem of getting X-ray quality welds in aluminum vessels. These welds were subject to pressure and had to be entirely free from porosity and oxide inclusions. After thoroughly investigating customer specifications, LINDE's service engineers recommended HELIARC inert gas shielded welding for the job.

Since then, about a half mile of these HELIARC welds have been OK'd by 100% X-ray inspections. According to company officials, HELIARC welding was "perfect for the job" and meant real savings by getting X-ray quality welds the first time without expensive rejections or repairs.

Whether you weld aluminum or other hard-to-weld metals, you, too, will find that fast, clean, HELIARC welding will save you time and production costs. HELIARC welding takes place under a shield of inert argon gas which eliminates the need for flux. As a result, HELIARC welds are free from porosity and oxide inclusions. This means fewer rejects and lower finishing costs. In fact, spatter-free HELIARC welds in many cases can be left "as welded."

You owe it to yourself and to your Company to find out more about the cost saving benefits of HELIARC welding. Call your local LINDE representative today. He will be glad to furnish you with detailed information on HELIARC welding.

LEFT Welding heavy aluminum sections with HELIARC *HW-10 torch. These welds were strong, dense, and required little finishing. BELOW The 300 amp.* HELIARC *torch has all-internal water-cooling of both torch head and power cable for cool, long-lasting operation. The HW-10 also features quick electrode adjustment.*

Linde TRADE-MARK

LINDE AIR PRODUCTS COMPANY

A Division of Union Carbide and Carbon Corporation

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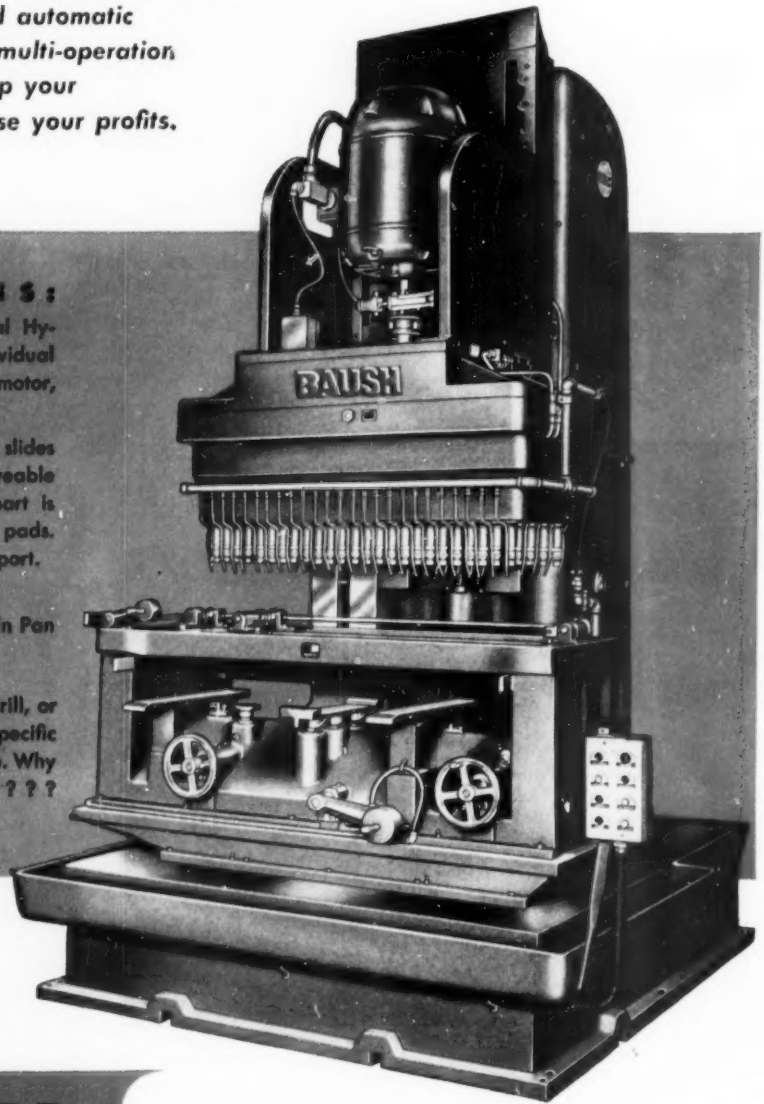
DESIGNED for the job!!!

Just as this Baush Multi-Spindle Tapper was designed to tap 50 holes simultaneously in the Pan Rail of a Tank engine, SO TOO can Baush design and build automatic multi-spindle and multi-operation machine tools to speed up your production and increase your profits.



SPECIFICATIONS:

Unit illustrated is Baush W-8 Vertical Hydraulic Tapping machine with 50 individual leadscrew spindles driven by a 30 HP motor, and equipped with coolant pump.

Holding fixture is of Tunnel Type. Part slides on rails between guide strips and moveable locators interlock electrically while part is cam clamped against hardened rest pads. Each end has hand-operated jack support.

OPERATION:

Tapping 50 — 3/8" × 16 Thread holes in Pan Rail of Tank Engine.

Whether it be a simple multi-spindle drill, or Automatic Transfer you need for your specific job, Baush Engineers are at your service. Why not let us help speed up your work ? ? ? Send us your job prints today.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Cuts wheel cost $1500 per year

The job: Cleaning department of foundry was using 8″ wheels with 4500 rpm grinders. When worn down to 5″ or 6″, wheels lost surface speed and metal removal dropped off. Wheels were laid aside or thrown away at this point.

Solution: Rotor Analyst suggested use of two Rotor 6000 rpm air grinders to use up discarded stub wheels.

Results: Investment of $400 in new Rotor Grinders saves $1500 yearly in wheel costs.

How much will this idea save in *your* plant? Ask your Rotor Analyst for a trial grinder to find out!

ROTOR GRINDER FACTS

Rotor D125—6000 rpm—9¾ lbs.
Rotor D88—6000 rpm—9 lbs.

Others from 3100 to 20,000 rpm. Straight or spade handles. Ask for Catalog No. 38.

The Gairing
STANDARD MILLING CUTTERS

E-CON-O-MILL

YOU'LL SAVE

ON INVENTORY • *Same size blades, for cutting steel, cast iron or non-ferrous, fit cutter bodies of all sizes in all series.*

ON GRINDING • *Blades are supplied sharpened, ready for use, may be re-sharpened in or out of the body, to a gage.*

WAITING for DELIVERY • *All series 2500 cutters 5" to 16" dia. and all blades carried in stock for immediate delivery.*

TOOLING by GAIRING

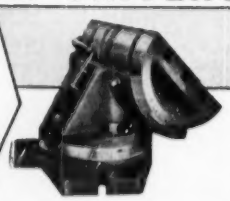
Whether you buy one or several sizes, you always save with E-CON-O-MILL. Proved savings in the cost of diamond wheels alone have caused many shops, both large and small, to standardize on E-CON-O-MILL • But, foremost, they're efficient cutters of truly one-piece rigidity • Get the whole story on this great development in standard tooling by writing for our E-CON-O-MILL catalog.

In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14

The GAIRING TOOL COMPANY • 21226 Hoover Road • Detroit 32, Michigan

BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.



Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes.

Write today for full information.

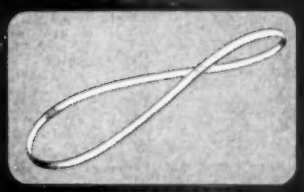
US AUTOMATIC BOX MACHINERY CO., Inc.

40 ARBORETUM ROAD • BOSTON 31, MASSACHUSETTS

3 ways to cut Metal

HAND

POWER



BANDSAWS

1 way to get the right Blade—

Call your VICTOR Distributor

For over 50 years, industry has *preferred* Victor Hand, Power, and Metal and Wood Cutting Bandsaws.

Why?

Because of their consistent *quality*—the finest steels fabricated on the most modern equipment.

Because of service from local strategically located Victor Distributors—as close as your phone—who can give quick delivery from stock—who are qualified—and who have factory assistance—to help you solve your metal cutting problems.

The Victor Distributor is the place to call not only for Victor Metal Cutting Saws but also for the hundreds of other products you need regularly to keep production up and costs down.

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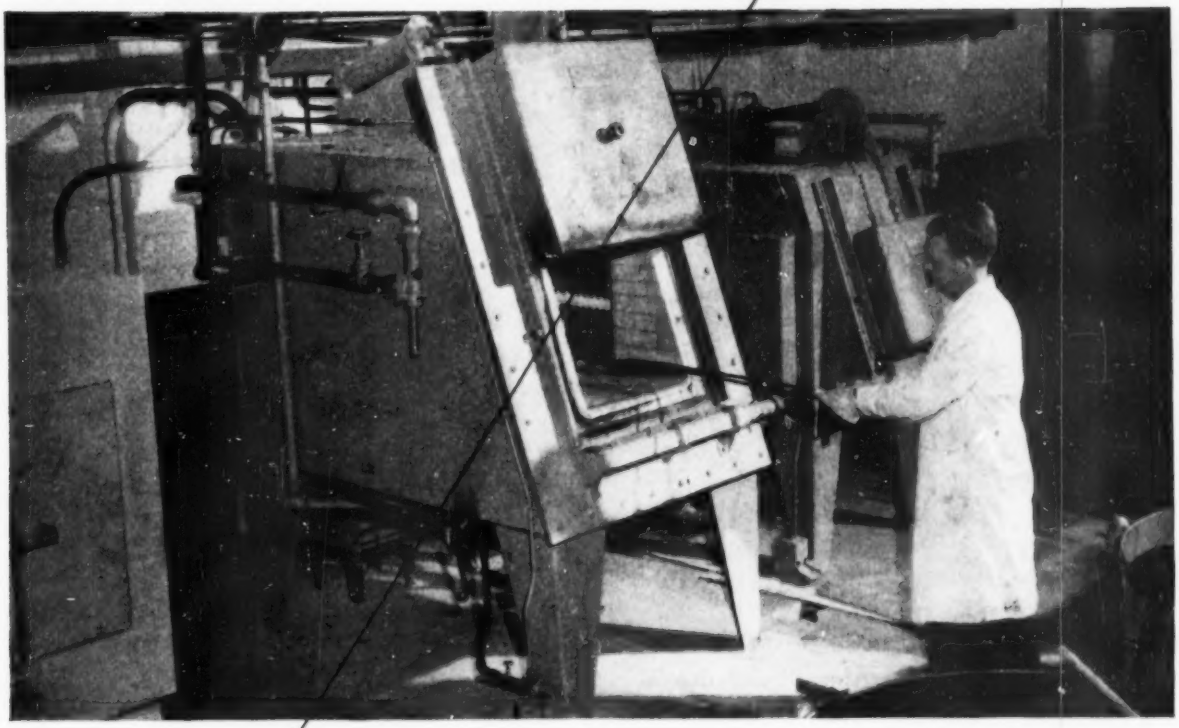
VICTOR

SAW WORKS, INC. • MIDDLETOWN, N. Y., U. S. A.
Makers of Hand and Power Hacksaw Blades, Frames, Metal and Wood Cutting Band Saws.

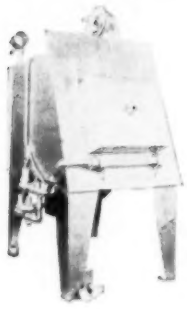
AT A. V. ROE, LTD.—in Canada

LINDBERG FURNACES

HEAT TREAT ORENDA TURBOJET ENGINE PARTS



In Canada, too . . . when production depends on precise heat treating, production men depend on Lindberg Furnaces



Proof of this is the fact that A. V. Roe (Canada) Ltd., in their new multi-million dollar aircraft plant, use Lindberg furnaces to heat treat parts for the world famous Orenda Turbojet engines.

Lindberg toolroom pre-heat and high speed Hydryzing furnaces... plus a toolroom Cyclone tempering furnace harden and temper stub shafts for the Orenda engine.

And a large box type production Hydryzer heat treats ten-stage rotor discs.

Lindberg Furnaces can solve your heat treating problem, too, from the touchiest tool and die job . . . to huge production jobs involving the hardening or tempering of tons of work daily. For descriptive literature contact your nearest Lindberg office.

Bulletin 96*hs* covers the type of furnaces used in the A. V. Roe plant

LINDBERG FURNACES

Lindberg Engineering Company, 2445 West Hubbard Street, Chicago 12, Illinois

Check JOHNSON single disc *a Better* CLUTCH *for the same money*

Better BECAUSE . . .
It's the only clutch with SEPARATOR SPRINGS that prevent heating in both HORIZONTAL and VERTICAL installations.

For some time there has been a demand for a single disc clutch for positive control of power transmission in the field of light machinery . . . a clutch that would stay cool on the job in both horizontal and vertical installations. This is "it."

If extreme compactness is not an essential, the Johnson No. 350 (3 h.p. max.) and No. 450 (6 h.p. max.) will meet or beat competition . . . as a better clutch at a competitive price. They incorporate most of the design principles of our Maxitorq multiple disc . . . and except for compactness and capacity, you will find them tops in their field. (Please read column at right . . . "Frankly Speaking" . . . for use recommendations.)

Several driving combinations are available, including V-belt. A simple hex key frees the knurled ring for easy manual adjustment. The "floating" disc prevents drag, abrasion, and heating in neutral. Machine and product designers will solve many problems in the light machinery field with this new Johnson single disc Clutch.

Send for Bulletin No. 250-AM-10

THE CARLYLE JOHNSON MACHINE CO.
MANCHESTER . . . . . CONNECTICUT

6CJ93

Frankly SPEAKING

Because of a large backlog of orders, The Carlyle Johnson Machine Company found it necessary to postpone the announcement of the new Johnson Single Disc Clutches.

Now, with added equipment for high speed production, it is possible to produce and ship the new clutches without undue delay. In fact, small orders or units for try-out in new machines will be forwarded at once. Design features make the Johnson especially suitable for installation in the following machinery:

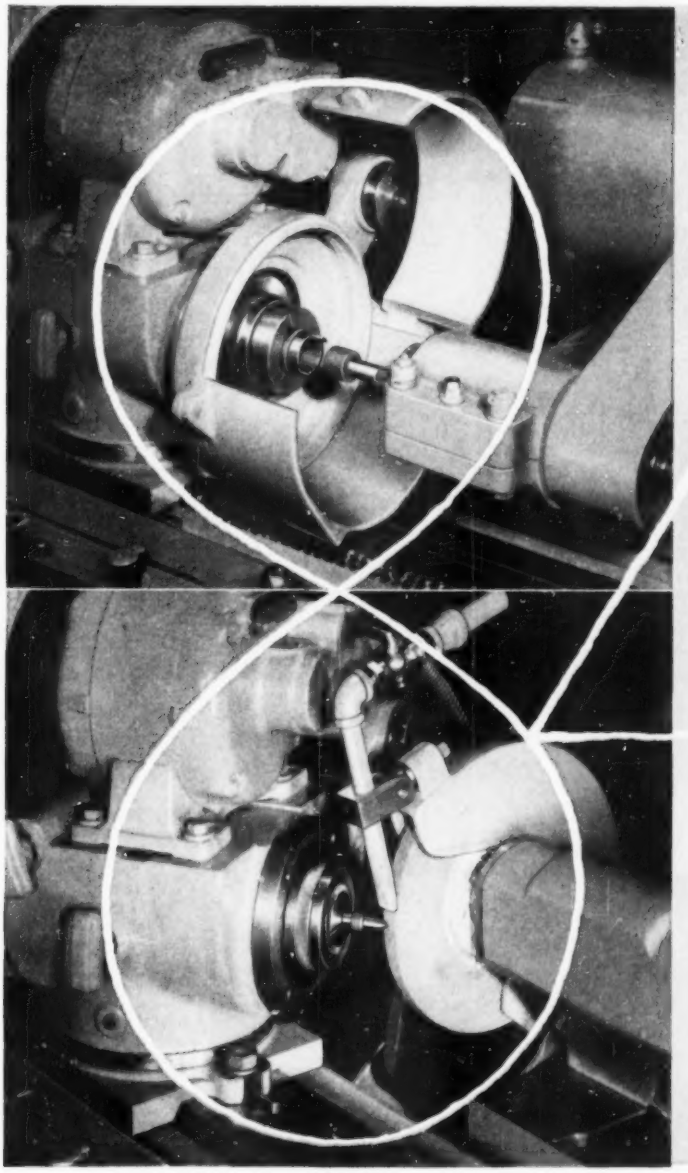
Accessory Drives, Air Compressors, Bag Making, Boat Drives, Bread Wrapping, Chain Drives, Combines (farm), Conveyors, Crop Seeders, Cultivators, Dusting Machines, Feed Grinders, Floor Scrubbing, Fruit Cleaners, Gasoline Engines, Generator Drives, Hay Balers, Hoists, Loaders, Lawn Mowers, Milk Coolers, Mixing Machines, Motor Scooters, Packaging Machines, Paper Shredders, Power Fans, Power Saws, Power Take-offs, Pumping Equipment, Sand Spreaders, Sewing Machines, Sheep Shearers, Spraying Equipment, Textile Machinery, Threshers (small), Tobacco Machinery, Tool Grinders, Tractors (garden), V-Belt Drives, Vegetable Sorters.

Naturally, these are but a few of the possible applications for the Johnson Single Disc Clutch. The field is wide open, with new machinery constantly being developed.

Included in the driving combinations are: Gear Tooth, Bolted Plate, Pulley Type, Hub Adapter, Cut-off Coupling Adapter, Single V-Belt Pulley Drive, and Double V-Belt Pulley Drive.

Carlyle Johnson engineers offer their engineering assistance in cooperation with your engineers and machine designers to develop the correct solution of your power transmission requirements. Write to Frank R. Simon, The Carlyle Johnson Machine Co., Manchester, Conn.

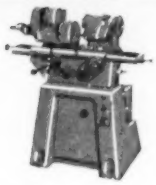
(Advertisement)



RIVETT

MODEL 84

INTERNAL-EXTERNAL GRINDER



This small hole grinder mounts interchangeable wheelheads for internal and external spindles. Hole capacity is 3" dia. with a maximum depth of 4"; external is to 3" dia. by a 4" length. Collets and step chucks mount directly in lathe-type spindle.

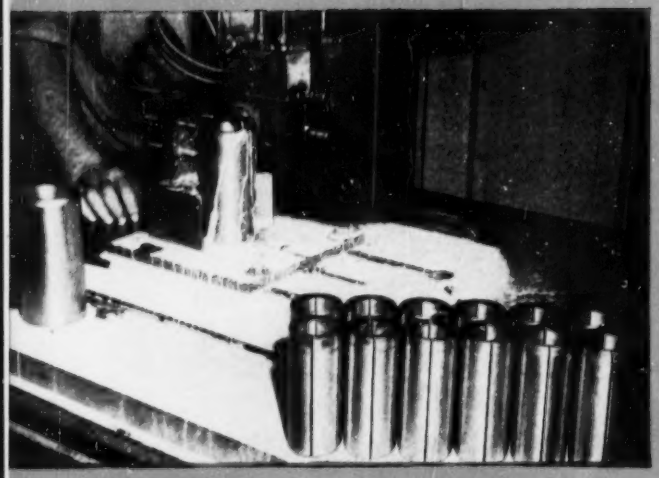
This flexibility combined with the inherent accuracy is why the Rivett 84 has gained great popularity in toolrooms since its introduction to the trade twelve months ago.

Quick and easy to set up, the 84 will handle your diversified jobs faster, too. All the details to prove this are shown in Catalog No. 84-A. **Write for a copy today!**

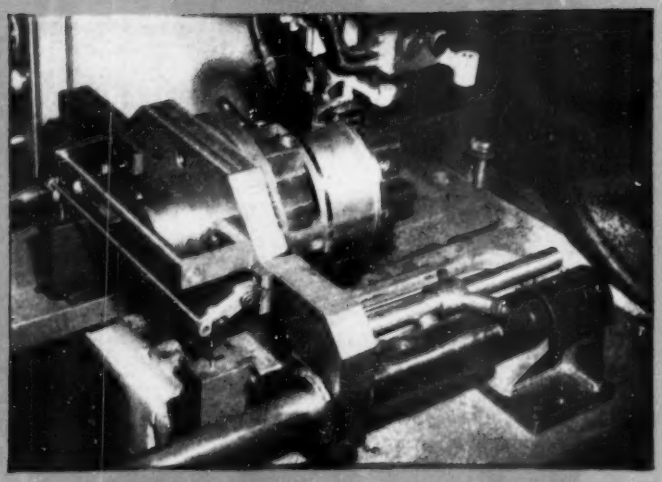
RIVETT LATHE & GRINDER, INC., DEPT. AMR 10, BRIGHTON 35, BOSTON, MASS.

PRODUCTION

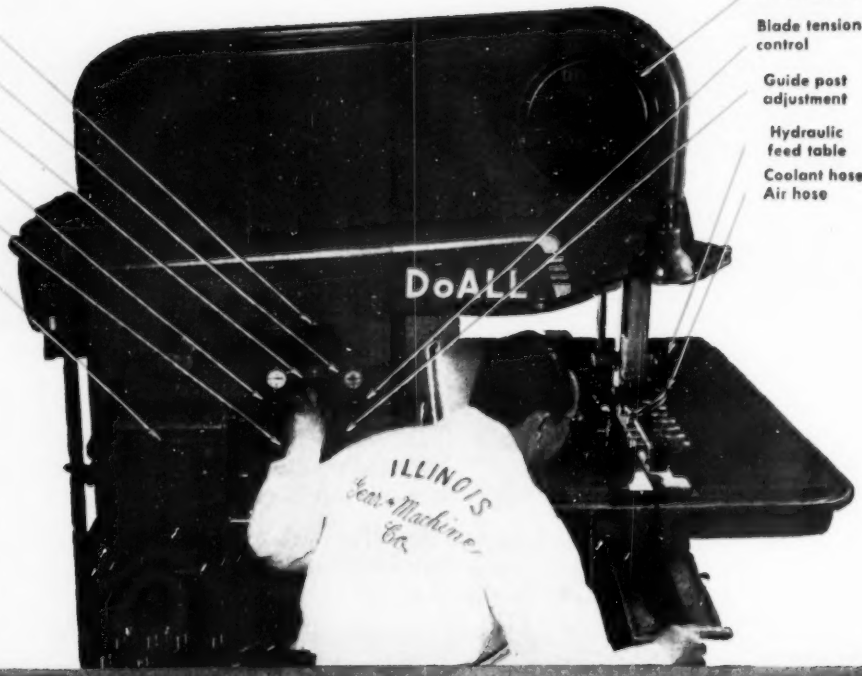
Low Cost Answer to Many Operations



SLOTTING Slotting bushings, using fixture and special heavy gage DoALL Saw Band to produce desired slot width.



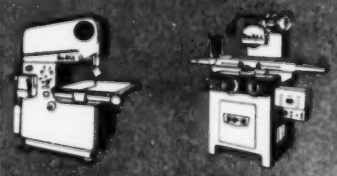
SLITTING Cutting heavy duty bearings in half. Adjustable fixture handles parts up to 11" dia. x 14" length.



DoALL
Contour-matic

...a versatile automatic production machine tool

*

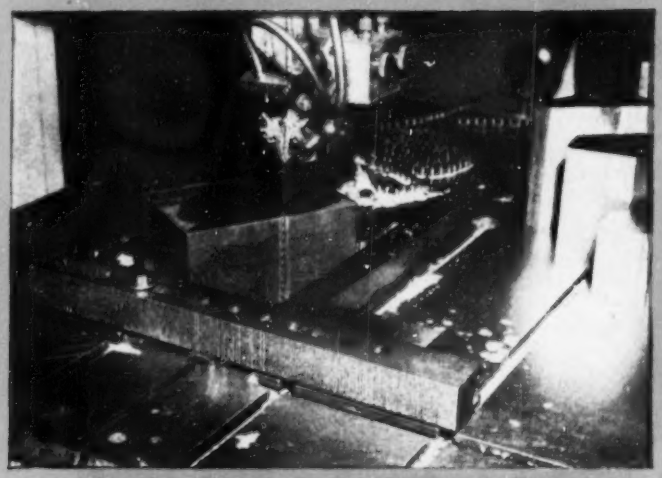


MACHINE TOOLS

CUTTING TOOLS

BANDSAWING

on Runs of Identical Parts



ANGLE CUTTING Back-up bar is bolted to saw table. An angle is bolted to back-up bar. Fully adjustable.

STOCK REMOVAL Excess stock required to hold pinions in gear cutter being removed automatically.

Use of Simple Fixtures Often Lets Bandsawing Replace More Costly Machining Methods

HOW the use of simple fixtures bolted to DoALL power feed bandsaw tables extends the usefulness of the machines in mass production work can be seen from the accompanying illustrations. Many jobs that would otherwise be performed on slower, more expensive machine tools are now being done on DoALL machines because of the user's ingenuity in devising fixtures.

The versatility of the DoALL Contour-matic makes it the preferred machine for production sawing. Variable hydraulic table feed, automatic stop, adjustable pressure coolant flow, adjustable pressure air flow to blow chips away from cut, blade speed range from 10 to 40,000 fpm, band tension control—these are a few of the features of this production machine.

To take advantage of the production economies possible with band machining, call your local DoALL Store, or write:

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.

DoALL

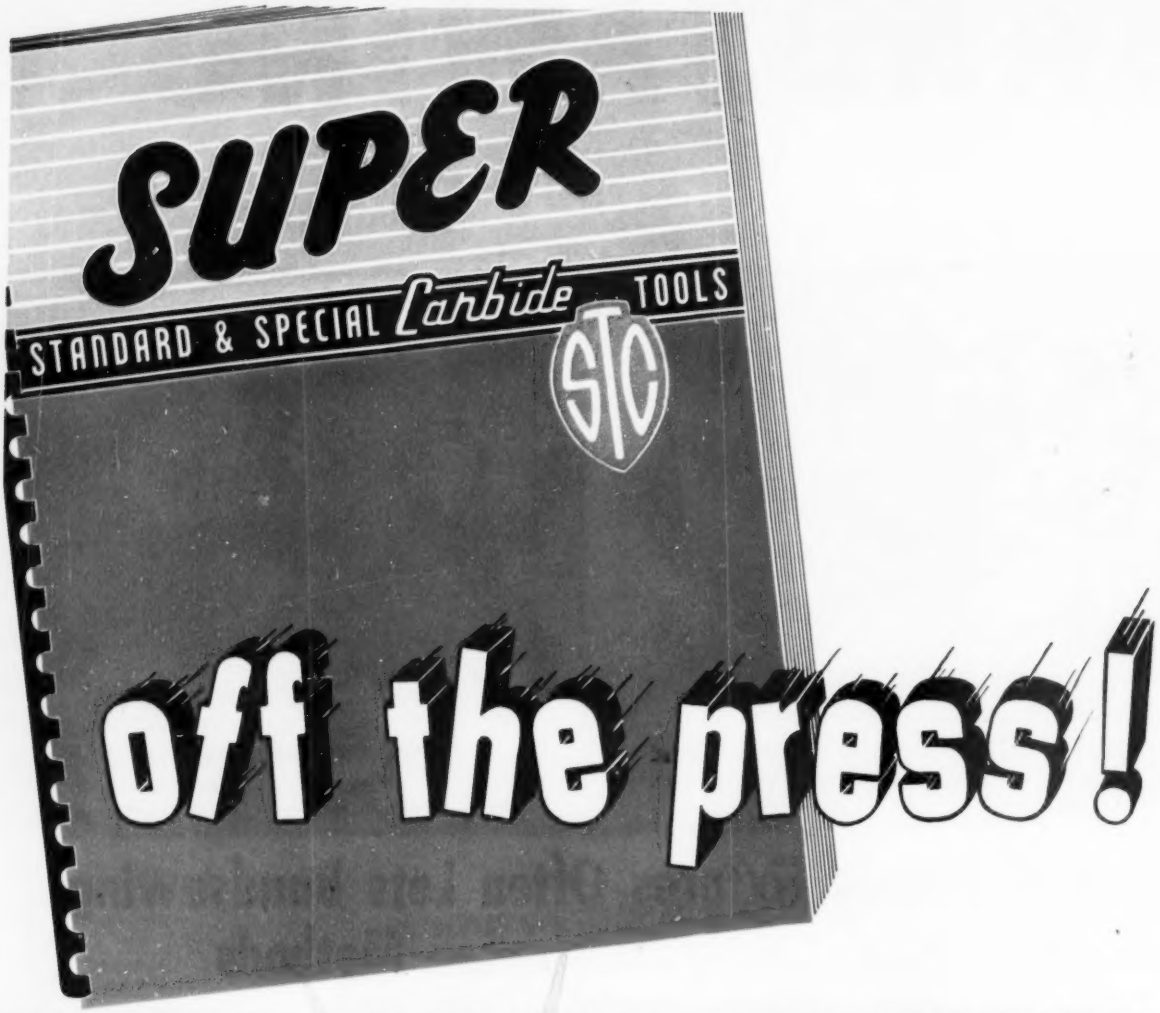
38 Sales-Service Stores to Serve You—See Your Phone Directory

See DoAll Equipment at the Metal Show in Cleveland, Oct. 19-23

8-10

GAGING EQUIPMENT

INDUSTRIAL SUPPLIES



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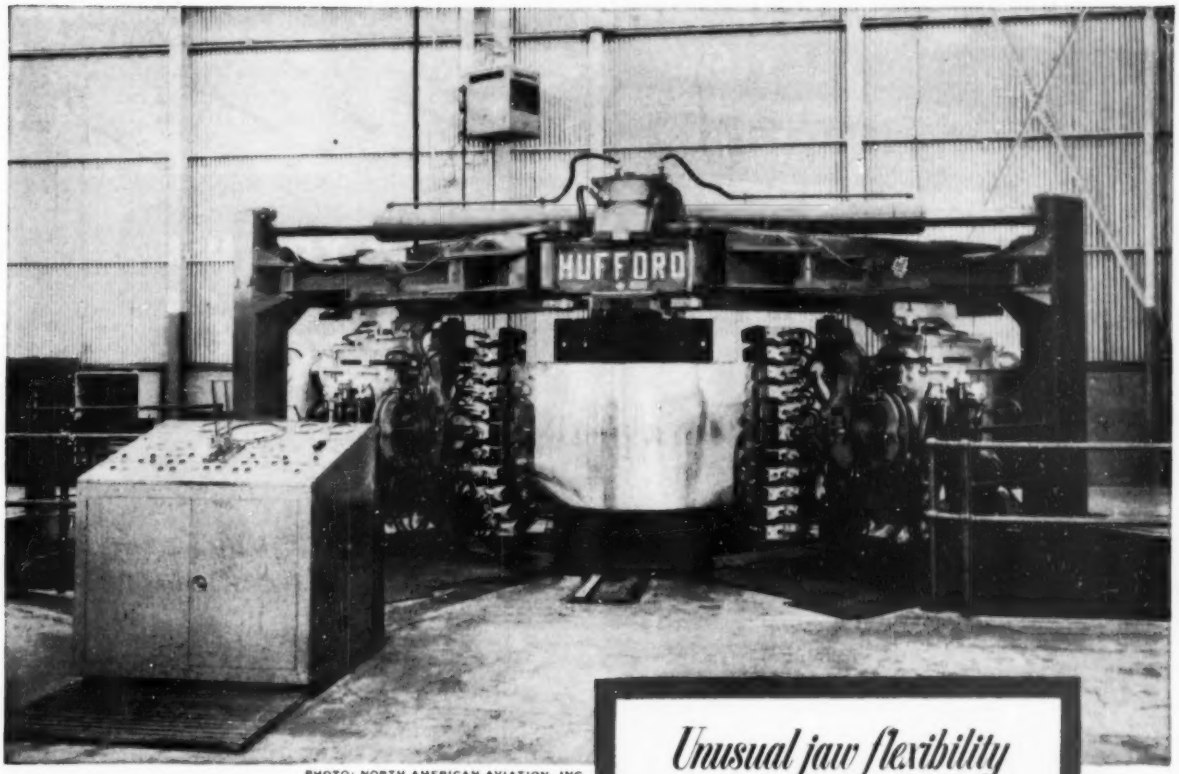


PHOTO: NORTH AMERICAN AVIATION, INC.

Hufford Hydra-Curve

The most flexible sheet jaw in existence!

Use on any stretch press • Saves up to 30% of material • Simplifies formation of both deep and shallow curves

One set of HYDRA-CURVE sheet jaws meets all common die requirements, on deep curves, shallow curves, convex-concave forms, hemispherical shapes, etc. Jaws are quickly adjusted to match desired die curvature, and instantly shape the sheet when energized. Segments always revert to a straight line for ease of loading.

Hufford HYDRA-CURVE Jaws *are available for all Hufford machines and can be used on other types of stretch presses. Ask for the HYDRA-CURVE folder—it tells the complete story!*

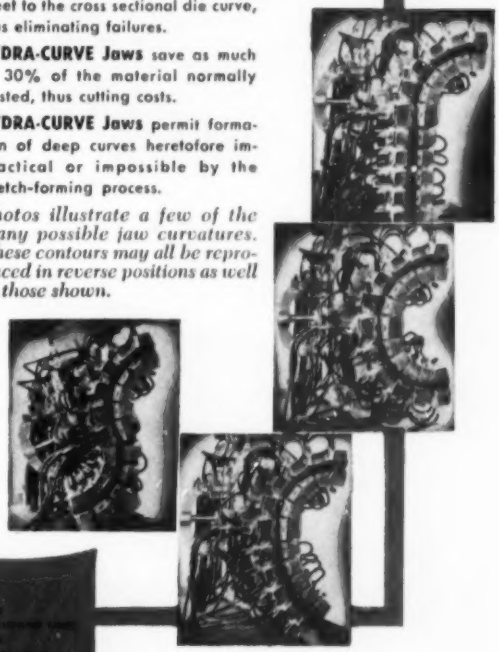
Unusual jaw flexibility improves part formation three ways!

HYDRA-CURVE Jaws reduce transitional area stresses by matching the sheet to the cross sectional die curve, thus eliminating failures.

HYDRA-CURVE Jaws save as much as 30% of the material normally wasted, thus cutting costs.

HYDRA-CURVE Jaws permit formation of deep curves heretofore impractical or impossible by the stretch-forming process.

Photos illustrate a few of the many possible jaw curvatures. These contours may all be reproduced in reverse positions as well as those shown.



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Machine Works Inc.
EL SEGUNDO, CALIFORNIA

Manufacturers of

BUILT TO AMERICAN DESIGN
BY EUROPEAN CRAFTSMEN

LONGITUDINAL TRAVEL 20"
CROSS TRAVEL 15"

Offering for prompt delivery, a quality jig borer that every small shop can afford.

CONDENSED SPECIFICATIONS

- 16 spindle speeds; 35-1500 rpm
- No. 30 Amer. Std. taper in spindle
- 14" from spindle ℄ to column
- Working table surface: 20" x 32"
- Spindle nose to table top — 0" to 20"
- Motor: 1 h.p. — 220v — 3 phase — 60 cycle — 2 speed

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Lower cost, smaller size Mac-it Screws can be used for all fastening jobs because of their exceptional tensile and torsional strength. Made from special Mac-it Alloy Steel held to rigid specifications, Mac-it Screws insure uniform and dependable screw performance.

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Mac-it is geared for large or small run production of screws with special design or strength characteristics. The high quality of Mac-it special Alloy Steel adapts it to heat treatment that penetrates throughout the screw structure so that the center possesses the same sturdy toughness as the outside. Each type Mac-it Screw is heat-treated for maximum strength in its specific use.

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The precision manufacture and quality control used in making Mac-it Screws provide users with high dimensional accuracy and uniformity. All Mac-it Screws in both coarse and fine threads are held to a class-3 fit. Mac-it maintains a fastener engineering service for the design, development and production of screws for all types of applications.

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Contact any of the hundreds of Mac-it distributors from coast to coast for immediate service to supply your requirements for standard or special screw products.

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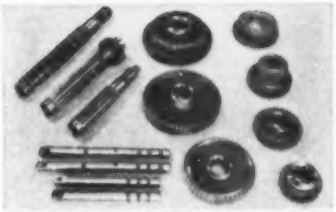
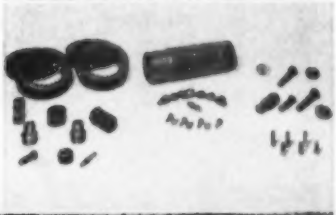
Manufactured by Mac-it Parts Co., Lancaster, Pa.

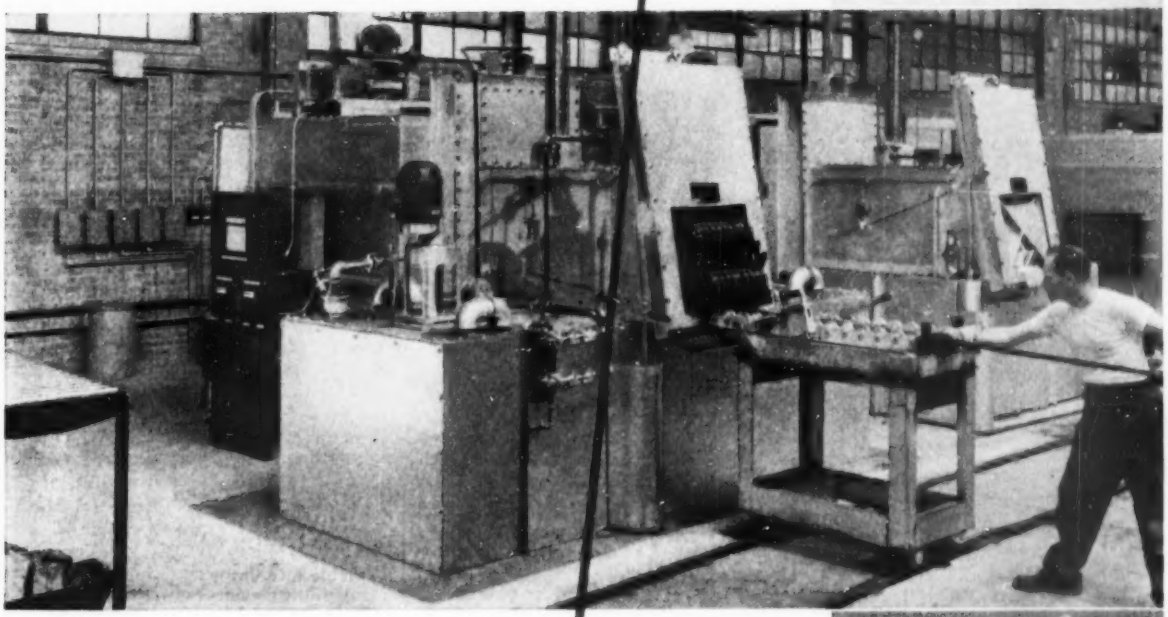
Contact your nearest Mac-it Distributor or the Home Office, Cleveland, Ohio, for full information on how Mac-it can solve your screw problems.

Surface Allcase Furnaces

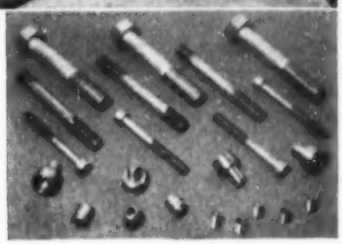
put production way up







and costs way down



A consistently rising demand for the Allcase furnace has necessitated production line manufacture. This is the best proof that these batch type radiant tube controlled atmosphere furnaces really have the capacity, versatility, and operating economy to make a small investment pay off quickly. They provide for gas carburizing, marquenching, clean hardening, dry cyaniding, carbon restoration, homogeneous carburizing, and clean annealing. One man can handle several Allcases . . . Gross heating rates are: Standard size: 500 lbs/hr.—Heavy-duty: 1600 lbs/hr. Write for Literature Group H53-8, or better still . . .

. . . SEE ALLCASE IN ACTION DURING THE METAL SHOW IN CLEVELAND: Surface Booth No. 321.

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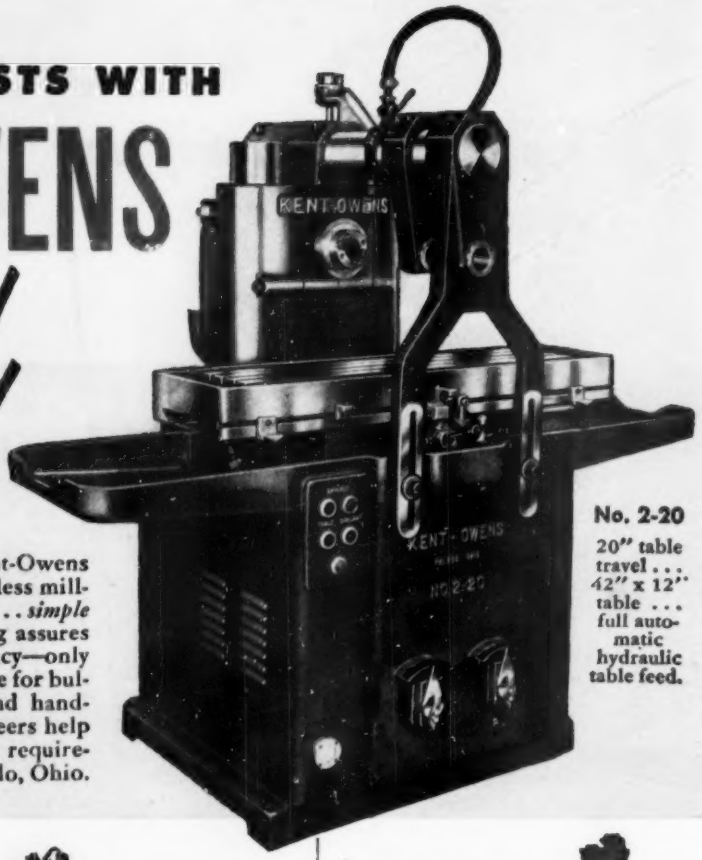
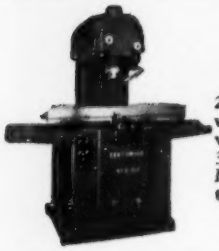
Speed and Accuracy!

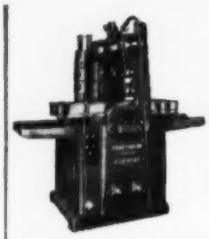
More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged . . . simple . . . versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.



No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.

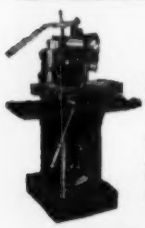


No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.

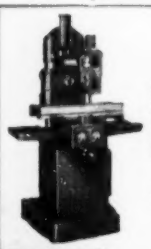


No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

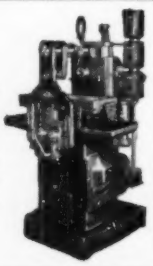
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.



No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.



No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.

No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

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it's OK let'er go!

OK Gang Slitter Knives photographed at Chase Brass & Copper Co., Waterbury, Conn.

the gang's * all ready at Chase Brass & Copper Co., Waterbury, Conn.

that's right . . . ready to knock down production costs because OK Gang Slitter Knives* can run hour after hour without re-grinding giving you top machine productivity at all times. Here's why: exact metallurgical specifications for OK steel—an exclusive heat treating process to give uniform hardness and temper—special grinding and finishing to tolerances of ± .00025 or closer if required.

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Cincinnati 23, Ohio
Please send free bulletins on OK Gang Slitters, etc.

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COMPANY _____
ADDRESS _____ STATE _____
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CINCINNATI 23, OHIO, U. S. A.

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V-LINER (PATENTED) INSPECTION UNIT

A new, universal inspection device which integrates all of the normal requirements of the Inspection Department

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space, man-hours, tool investment.

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The V-Liner Inspection Unit incorporates, all of the skill, precision and experience gained by Swanson in more than a third of a century of designing and building special automatic machines. Swanson machines have reduced costs, increased output and improved precision in hundreds of manufacturing operations.

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TOOL & MACHINE PRODUCTS INC., ERIE, PA.

Quality since 1919

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FOR EVERY PURPOSE

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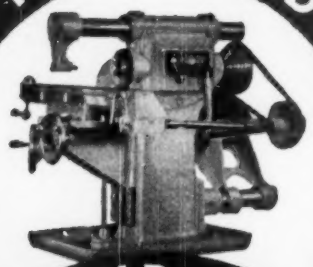
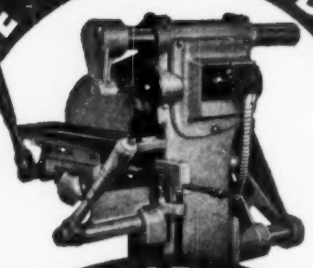
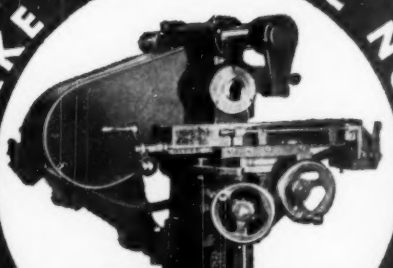


BURKE HAND FEED NO. 3



BURKE UNIVERSAL NO. 4



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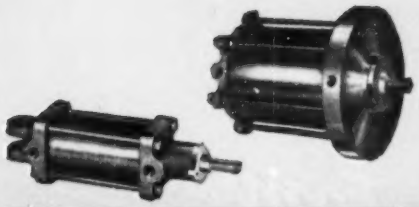
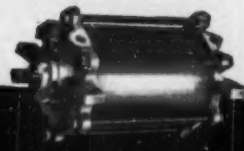
Brotherton Road 6, Cincinnati 27, Ohio



Pneumatic Cylinders



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Write for Bulletin 210

NEW! REVOLUTIONARY HANNIFIN *P-M Pilot-Master Valves*

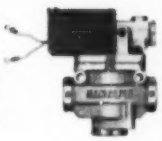
Piston-operated poppet design. Exclusive replaceable cartridge for easier maintenance. Speeds to 600 cycles per minute. Pressure from 15 to 150 p.s.i. Integral, solenoid-controlled pilot heads or a choice of 10 separate pilot valves for remote control.

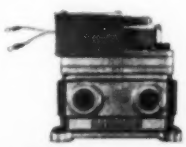
- Fewer Valves to Stock
- Fewer Parts to Stock
- Maximum Interchangeability
- No Springs in Main Valve

Write for Bulletin 231.

2 and 3-Way Valves.

Same valve operates 2-way or 3-way, normally open or normally closed. ⅜" to 1¼" I.P.S.





4-Way Valves.

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges. ⅜", ½", ¾" I.P.S.

EXCLUSIVE REPLACEABLE CARTRIDGE

AIR WARDEN

Air filters, pressure regulators and lubricators to protect air operated equipment. Bulletin 1010B.

Disc Type Air Control Valves

Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes: ⅛" to 1¼" I.P.S.

Write for Bulletin 57-W

Hannifin "Directair" electrically controlled air-operated disc valve

Foot-operated treadle valve (Also spring return and rotary types)

Standard hand control valve (Single or duplex)

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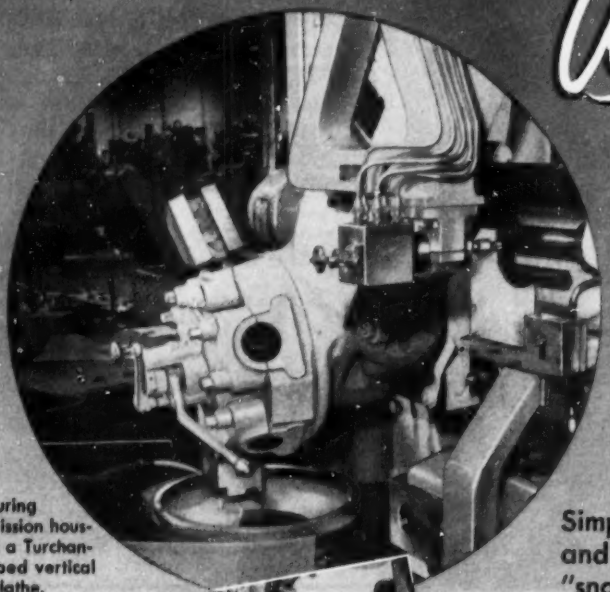
Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

Turchan has what industry needs in the trend to Automation



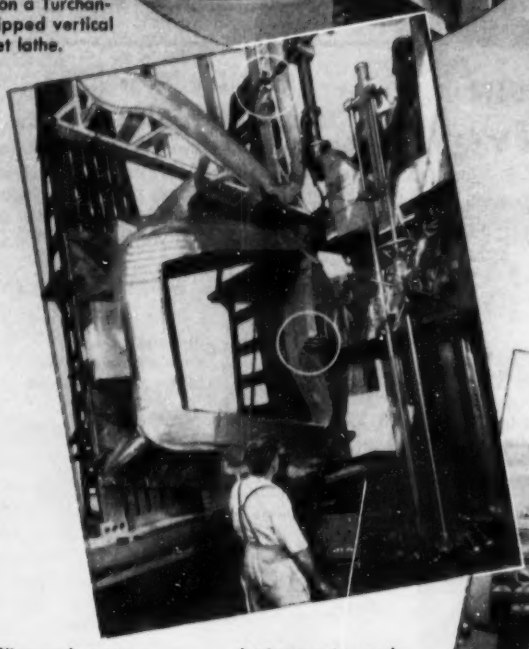
Contouring transmission housing on a Turchan-equipped vertical turret lathe.

tracer-controls help meet demands for

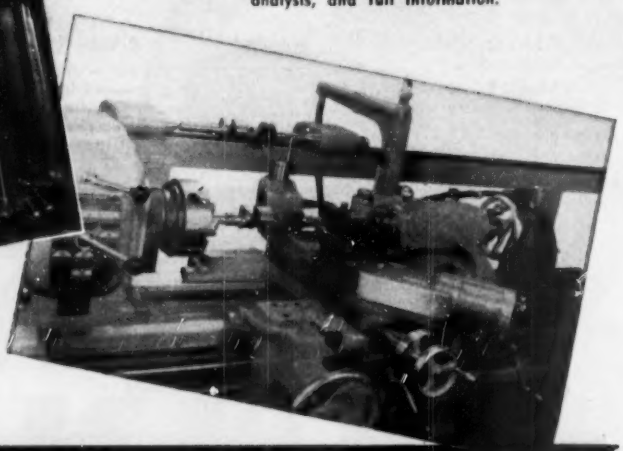
- *improved quality*
- *automatic production*
- *lower costs*

Simplify difficult contouring, profiling and boring jobs—make straight work a "snap". Include Turchan equipment in your present and future plans for automation of standard or special machines, assuring finest precision tracer-controlled operation. Any size or make machine tool can be Turchan-equipped.

Investigate what Turchan equipment can do for you—send a sketch and specifications for job analysis, and full information.



Profiling and countouring large auto body die by Turchan tracer controlled boring mill.



Intricate auto crankshaft being turned by Turchan 45° compound lathe attachment.

Turchan FOLLOWER MACHINE CO.

Machine Tools Division, 8459 Livernois Avenue, Detroit 4, Michigan

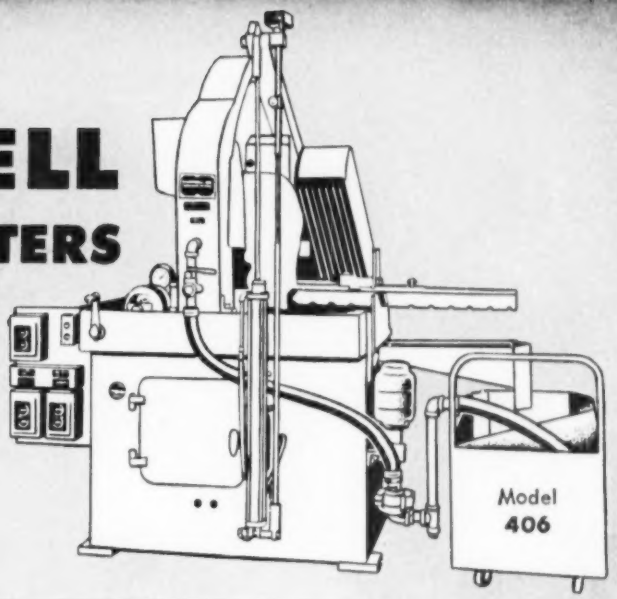
For 20 years, designers and builders of automatic hydraulic tracer-controlled equipment for standard machine tools and special machines

ACCO products

See These Machines—

CAMPBELL
ABRASIVE CUTTERS

For fast, clean, accurate cutting of hard, soft, round, hex, square, or shaped stock



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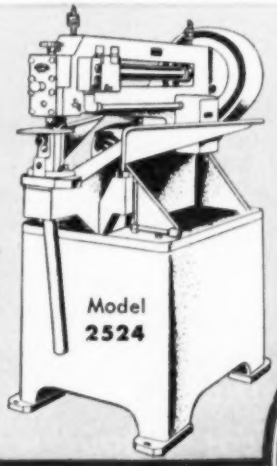
See the Campbell Cut-Off Machines and Nibblers in action!

CAMPBELL
NIBBLERS

Cut odd shapes from ferrous or non-ferrous shapes



ACCO

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AMERICAN CHAIN & CABLE

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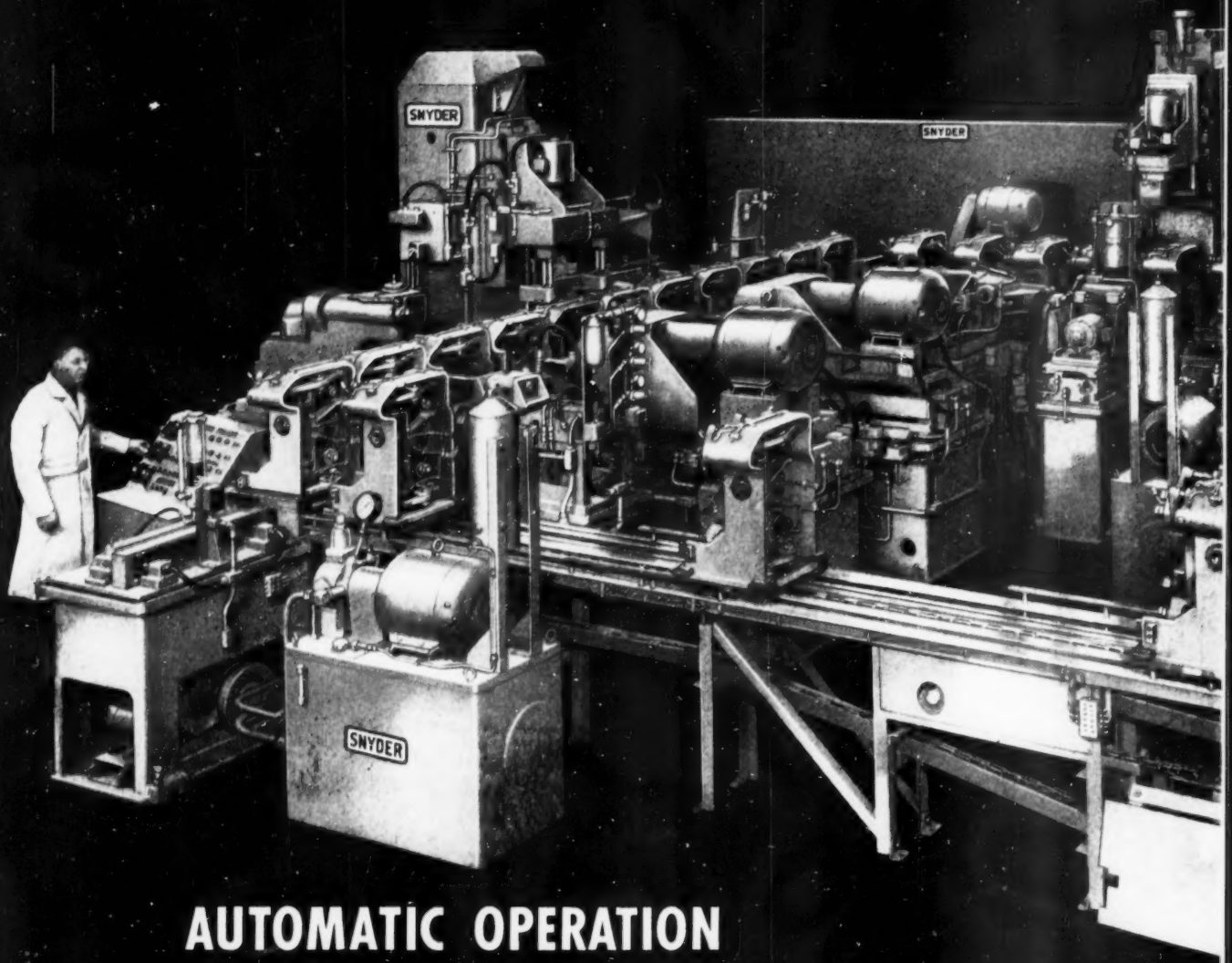
Abrasive Cutters and Nibblers

SNYDER MACHINES CONTROL COSTS

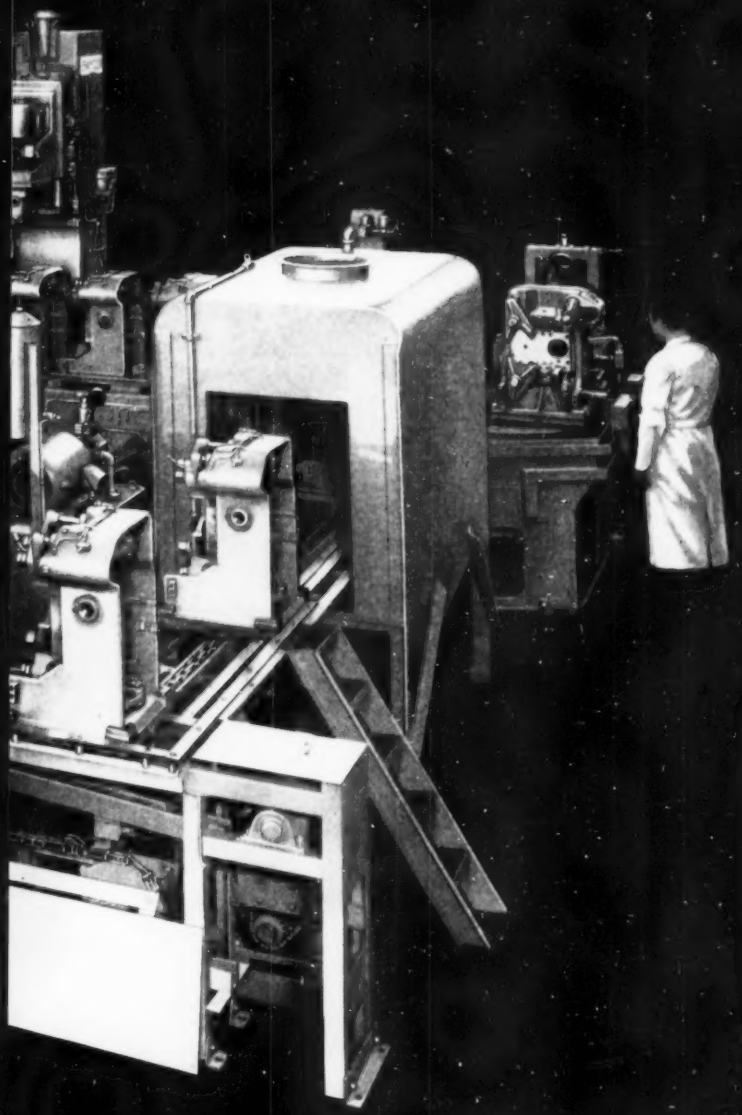


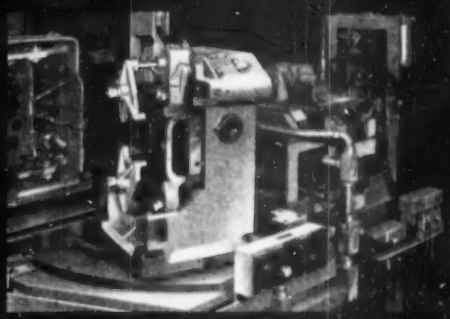
AUTOMATIC OPERATION

MILLS, DRILLS, TAPS, BORES, COUNTERBORES, COUNTERSINKS FRONT COVERS FOR AUTOMOTIVE ENGINES • AUTOMATIC INDEXING, LOCATING, CLAMPING, AND RELEASING • AUTOMATIC TRANSFER THROUGH TWO-STAGE, CONTINUOUS WORK CYCLE • AUTOMATIC CONTROLS • AUTOMATIC SAFETY INTERLOCKING SYSTEM • AUTOMATIC LUBRICATION • AUTOMATIC CLEANING AND CHIP REMOVAL • SKILLED OPERATORS NOT NEEDED

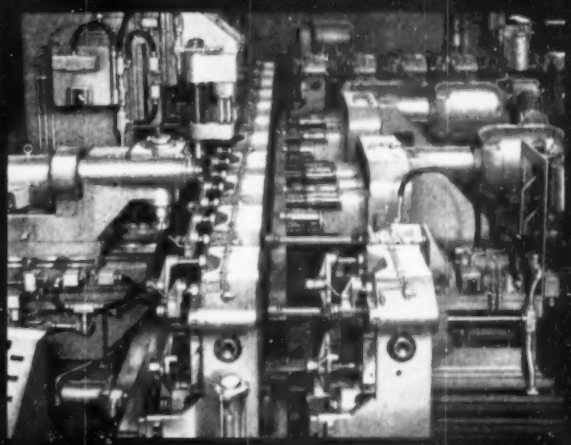
18 STATION AUTOMATIC TRANSFER

180 FRONT COVERS AN HOUR AT 100% EFFICIENCY





At Station 18 the fixture is rotated 90°, air wrenches unclamp the part so that it is easily removed. The fixture returns to Station 18, engages the return conveyor, is automatically blown clean and returned to the loading station.



Fixtures leaving Section 1 (above) move at right angle so that the other faces and top of the part are exposed to tools. The part enters the work cycle with three ground faces, leaves it ready for assembly.

SNYDER

TOOL & ENGINEERING COMPANY

3400
E. LAFAYETTE

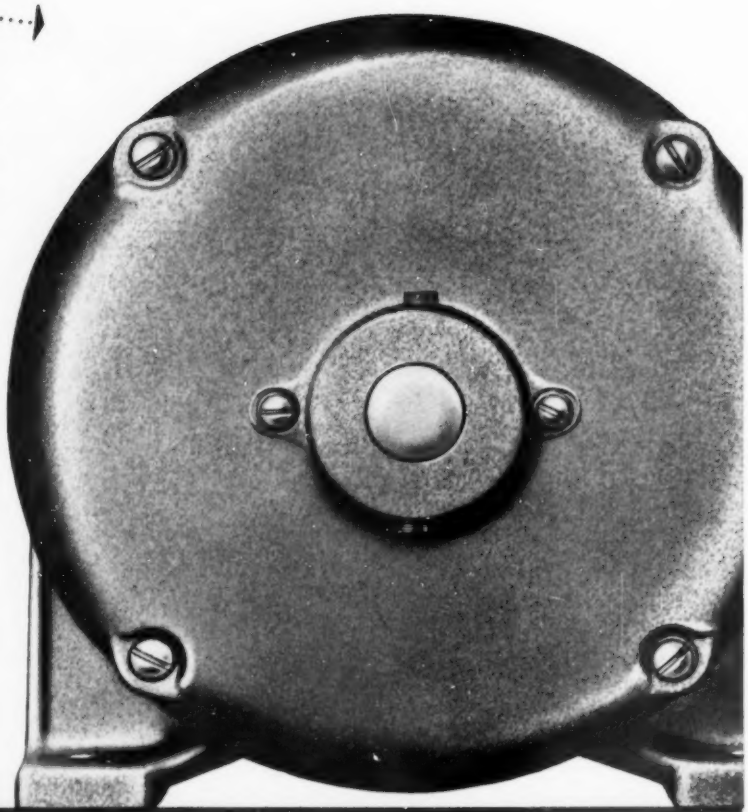
DETROIT 7,
MICHIGAN

28 Years of Successful Cooperation with Leading American Industries

DEPENDABILITY...
that builds dividends
Delco Motors

Delco integral motors are one item of manufacturing cost that does not come under the head of "variable." They are so consistently dependable in operation that they have a stabilizing effect on production costs—and on dividends.

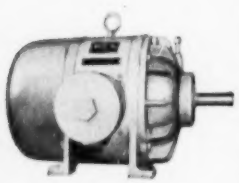
There are Delco motors for most applications—motors that will fit into **your** needs. A sales engineer from any one of the offices listed below will respond to your inquiry.



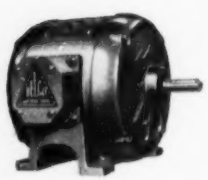
DELCO DAYTON OHIO

DELCO PRODUCTS

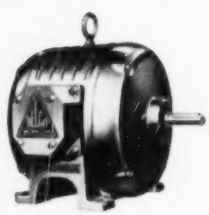
Division of General Motors Corporation
Dayton, Ohio



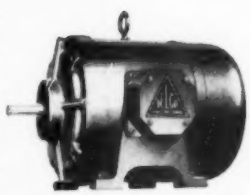
Explosion-Proof Motor



Open Ball-Bearing Motor



Totally Enclosed Motor

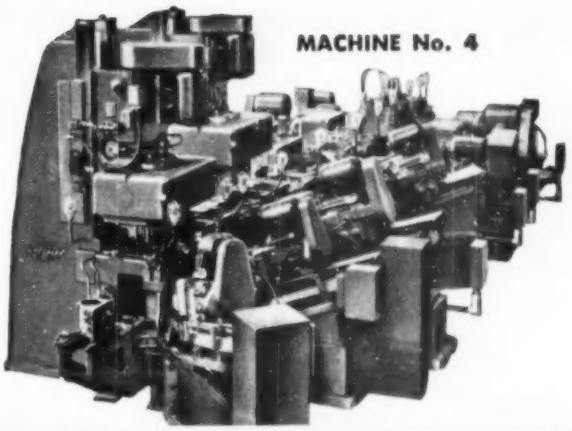


Totally Enclosed Fan-Cooled Motor

SALES OFFICES: Atlanta • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Hartford • Philadelphia • St. Louis • San Francisco

208 OPERATIONS IN 44.3 SECONDS

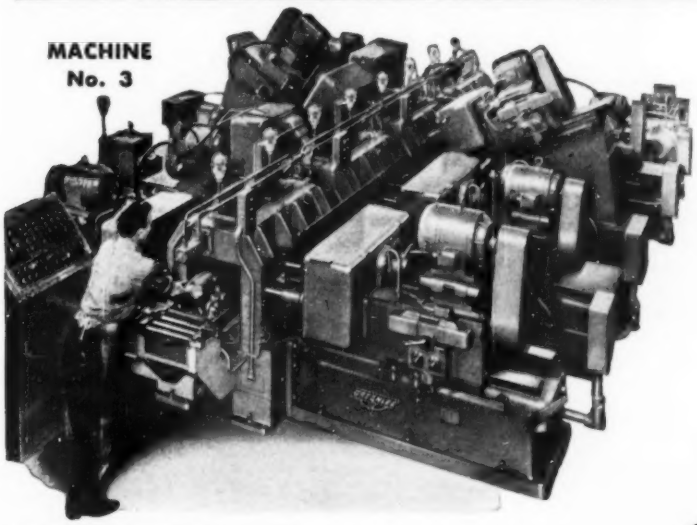
These recently-built Greenlee transfer machines mill, bore, drill, ream, and tap transmission cases for a well-known automobile. A total of 183 tools complete 208 operations in an automatic cycle time of 44.3 seconds. Features include face and end-milling heads, turnover and chip-cleanout stations, and indicator lights for tool changing. Self-contained hydraulic units conform to JIC standards for easy maintenance. These outstanding machines are among the newest built by Greenlee — a pioneer in progressive transfer-machine principles.



MACHINE No. 4

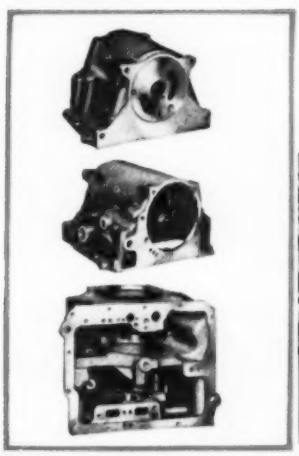
GREENLEE

MACHINE No. 3

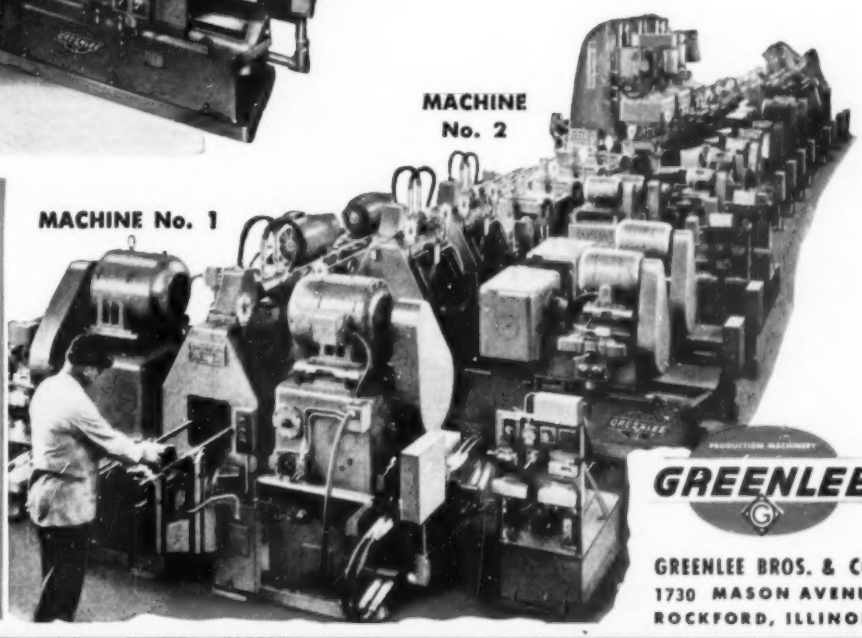


TRANSFER MACHINES
PROCESS
AUTOMATIC
TRANSMISSION CASES
AT THE PRODUCTION RATE OF
65 CASES PER HOUR

MACHINE No. 2



MACHINE No. 1



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ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER-PROCESSING MACHINES

BUILT TO BE JAM-PROOF!

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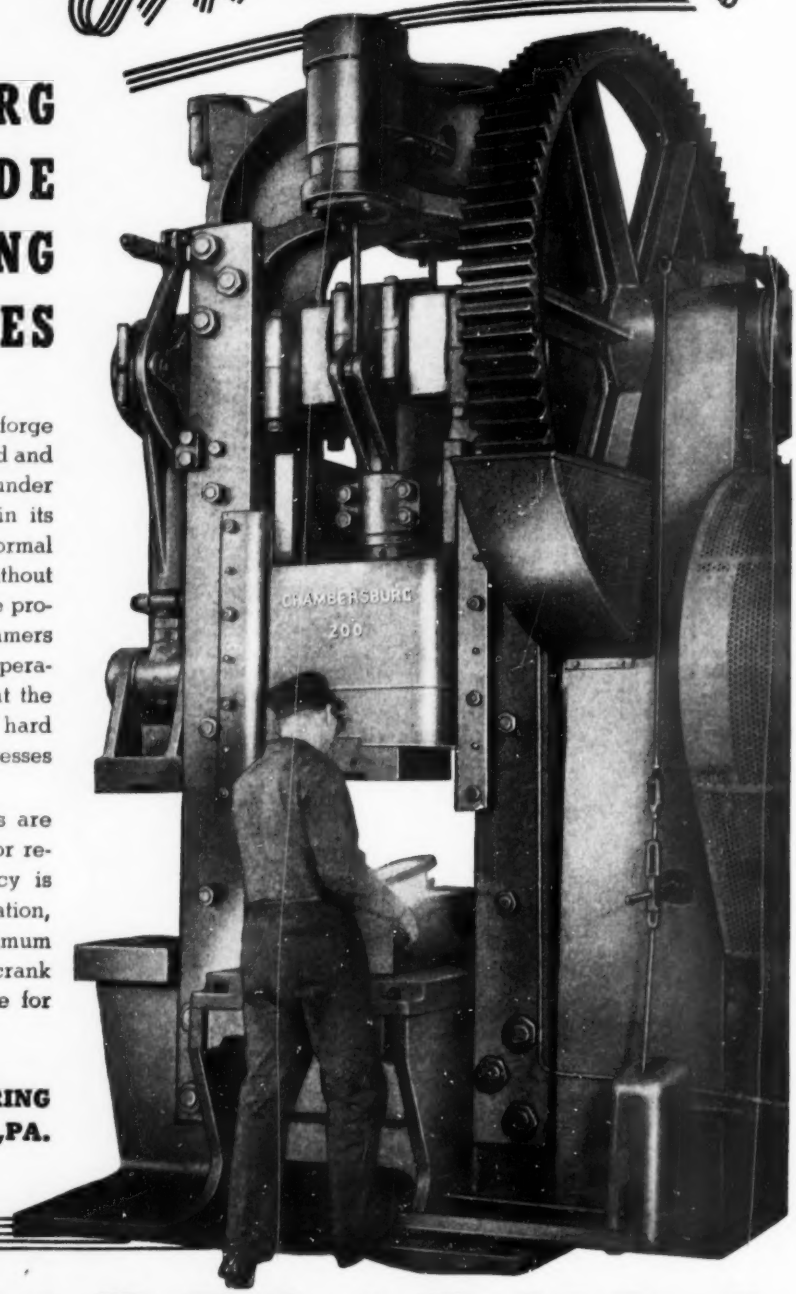
Trimming presses designed for forge shop use. Used to trim, punch, bend and size. Each press, thoroughly tested under overload conditions, must maintain its al gnment when stalled from normal speed, and function perfectly without adjustment after the test. When the production of your line of forging hammers is dependent upon the continuous operation of the trimmer—you will want the one that can stand day after day of hard usage. Chambersburg Trimming Presses are practically indestructible.

Chambersburg Trimming Presses are easily accessible front and back for removal of stock. Greater efficiency is possible through continuous operation, low power consumption and minimum floor space. Single and double crank types. Wide range of sizes. Write for Bulletin 3-L-9.

CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.



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"FORGING IN MID-AIR"

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with all sizes...
all grades...and...all finishes--

Castle

supplies all types of

COLD FINISHED BARS

to meet exact customer requirements --from one of the most complete stocks in the U.S.A.

Hats off to Johnson Motors--the only manufacturer who has built a million outboard motors! It takes a truly superior product...with a long record for superior performance...to earn the buying confidence--that enables it to top the million mark in sales. A. M. Castle & Co. is indeed proud of its long association with Johnson Motors...and...to have supplied all types of cold finished bars used in the production of this outstanding product.

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And when you order from Castle--you'll get exactly what you want...plus...fast, friendly, intelligent service on every order. That's been a Castle tradition for over 61 years. And that is one of the main reasons why A. M. Castle & Co. is one of the largest independent steel distributors in the United States--with nine large, heavily stocked, fully equipped warehouses from coast to coast. For cold finished bars...and...EVERYTHING else in steel --phone A. M. Castle & Co.

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SHEETS PLATES STRUCTURAL and many others
in a large variety of sizes, grades, and finishes--for immediate delivery.
from coast to coast

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You can save time, trouble and money by concentrating on your volume material requirements and relying on your nearby Reynolds Distributor to stock and supply you with the thousands of odd lot items that you only need occasionally or in small quantities.

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Clingan & Fortier, Inc., Fresno, San Francisco and Vernon (Ingot also)
Tay-Holbrook, Inc., San Francisco
Union Hardware & Metal Co., Los Angeles
United States Steel Supply Div., Los Angeles

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Salt Lake Hardware Co., Grand Junction

CONNECTICUT
American Steel & Alloys Corp., Hartford

DISTRICT OF COLUMBIA
Lyon, Conklin & Co., Inc., Washington

FLORIDA
Horne-Wilson, Inc., Jacksonville, Miami, Orlando and Tampa
Southern States Iron Roofing Co., Jacksonville, Miami, Orlando and Tampa

GEORGIA
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IDAHO
Salt Lake Hardware Co., Boise

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McDonnell Bros., Inc., (Architectural only) Detroit
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Vincent Brass & Copper Co., Minneapolis

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Marsh Steel Corporation, North Kansas City

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Barth Smelting Corp., (Ingot only) Newark
Edgcomb Steel Corporation, Hillside
Mapes & Sprowl Steel Co., Union

NEW YORK
Barth Smelting Corp., (Ingot only) Newark, N. J.
J. G. Braun Co., (Architectural only) New York
Edgcomb Steel Corporation, Hillside, N. J.
Mapes & Sprowl Steel Co., Union, N. J.

NORTH CAROLINA
Southern States Iron Roofing Co., Raleigh

OHIO
The Atlas Metal Co., (Ingot only) Cleveland
The G. A. Avril Company, (Ingot only) Cincinnati
The Hamilton Steel Co., Cleveland
Mutual Manufacturing & Supply Co., Cincinnati
Vorys Brothers, Inc., Columbus

OREGON
Woodbury & Company, Coos Bay, Eugene, Medford and Portland

PENNSYLVANIA
Athos Steel Service Co., Philadelphia
Levinson Steel Sales Company, Pittsburgh
Merchant & Evans Co., Philadelphia
Potts-Farrington Company, Philadelphia
Nathan Trotter & Co., Inc., (Ingot only) Philadelphia

SOUTH CAROLINA
Southern States Iron Roofing Co., Columbia

TENNESSEE
Southern States Iron Roofing Co., Memphis and Nashville

TEXAS
Moncrief-Lenoir Mfg. Co., Dallas, Harlingen, Houston, Lubbock, San Antonio and Temple
Vinson Supply Co., Dallas, Odessa and Snyder

UTAH
Salt Lake Hardware Co., Salt Lake City

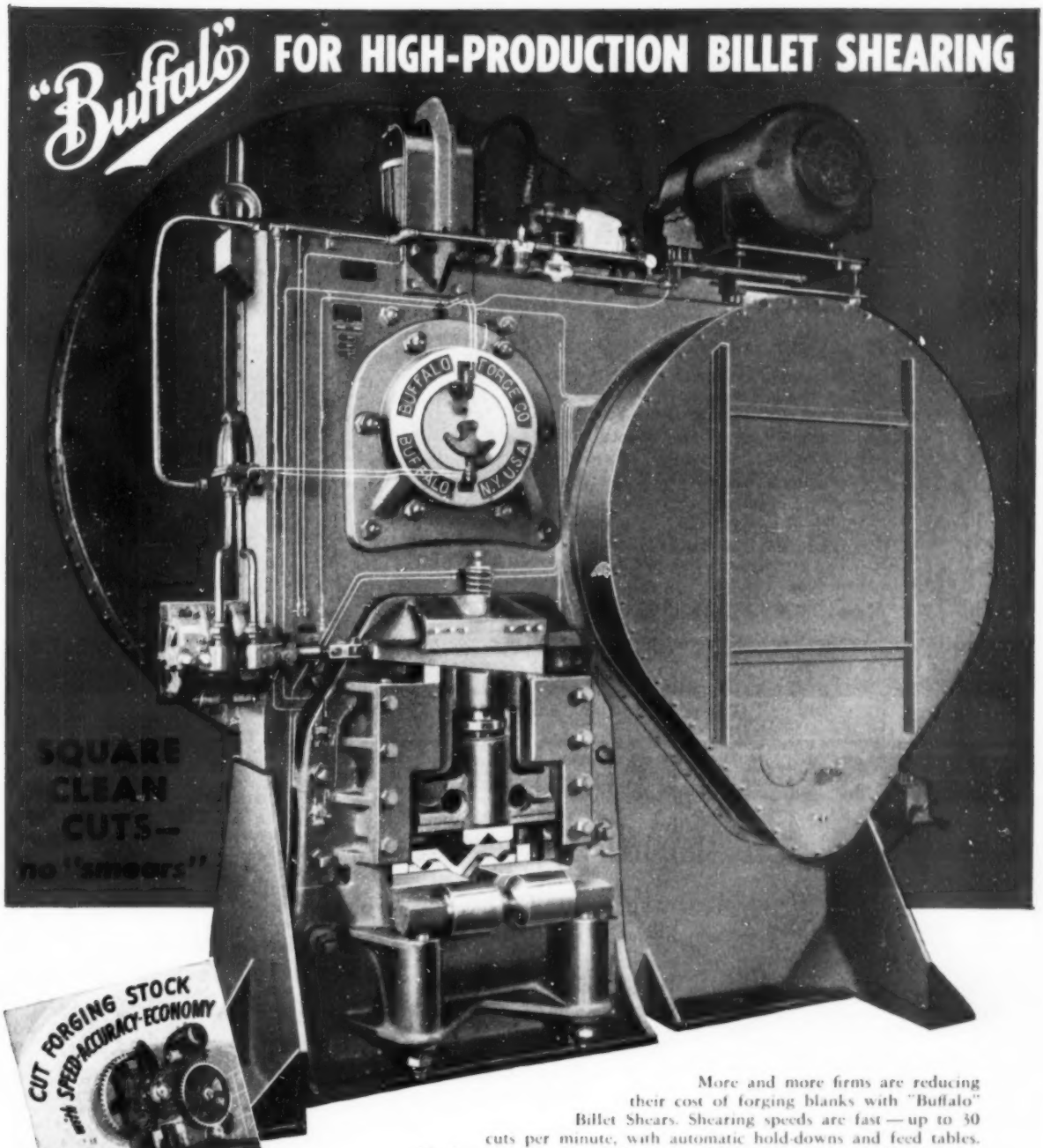
VIRGINIA
Southern States Iron Roofing Co., Richmond

WASHINGTON
Clingan & Fortier, Inc., Seattle

WISCONSIN
Benjamin Wolff & Co., Milwaukee

Look Under "Aluminum" in Your Classified Telephone Directory

"Buffalo" FOR HIGH-PRODUCTION BILLET SHEARING



More and more firms are reducing their cost of forging blanks with "Buffalo" Billet Shears. Shearing speeds are fast — up to 30 cuts per minute, with automatic hold-downs and feed tables. Blank ends are square and clean with no "smears" or notches, because the knives penetrate only 3/16", localizing a sharp vertical fracture. Porosity is easily detected. For better forging practice, start with a "Buffalo" Billet Shears. Sizes up to 10" rounds and 9" squares. Write for Bulletin 3295.

"Buffalo" MACHINE TOOLS

BUFFALO "FORGE COMPANY

509 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co, Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

DO YOU NEED

Surface Grinding to Gage Tolerance?

Dependable Grinding Performance in Production?

Positive Dust Protection?

. . . if so, Boyar-Schultz No. 6-12 is the Surface Grinder for YOU!

It has the capacity to handle the biggest part of the tough assignments encountered in any shop. It has the accuracy to obtain the high precision needed in tool and gage making. In production it proves so sturdy that long runs, with accuracy, are no problem.

The New Dust Collector, made specially for No. 6-12 Surface Grinder is furnished as optional equipment and is built into the Grinder at the factory. With this Dust Collector no more floor space is required.

BIG MACHINE PERFORMANCE—Small Machine Cost

BOYAR-SCHULTZ CORPORATION

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The Modern Way

Illustration shows typical set-up for cutting taper keyways with table tilted.

Machines are made in three sizes for keyways 1/16" to 1" in width.

Great simplicity and ease of operation of Davis Keyseater, assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

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ACCURACY IN SURFACES FROM WHICH MEASUREMENTS START IS IMPORTANT

TO BE CERTAIN — SPECIFY G. S. SURFACE PLATES AND ANGLE IRONS

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ROLL FORMING MACHINES & ROLLER DIES

Engineering Service on Your Metal Forming Problems

J & L MACHINERY & SUPPLY CO.

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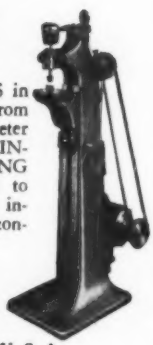
GRANT



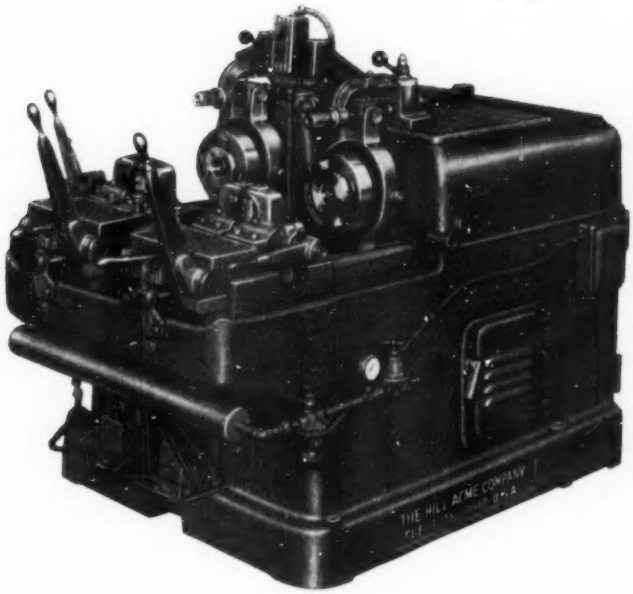
RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

85 Sillimas Ave., Bridgeport, Conn., U. S. A.

Another FIRST



FOR

ACME XL

THREADING MACHINES

Air operated Head now available . . .

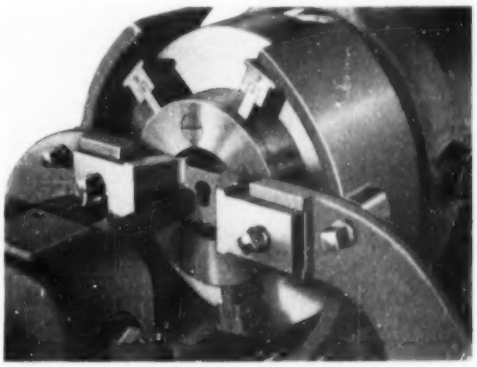
Acme Model XL Threading Machines can be equipped with a semi-automatic, air-operated head-opening and closing mechanism for rapid lock and release of dies to provide greater accuracy of thread length and reduce operator fatigue. A bleeder valve adjustment provides variable speed to this head tripping mechanism. Forward and return movement of the carriage effects the opening and closing of the die head.

This new device is an exclusive feature of ACME Model XL Threading Machines and is adaptable to both single and double spindle machines in the complete range of sizes offered.

HILL ACME TOOLS FOR INDUSTRY

ACME HOB TYPE 5 DIE HEAD

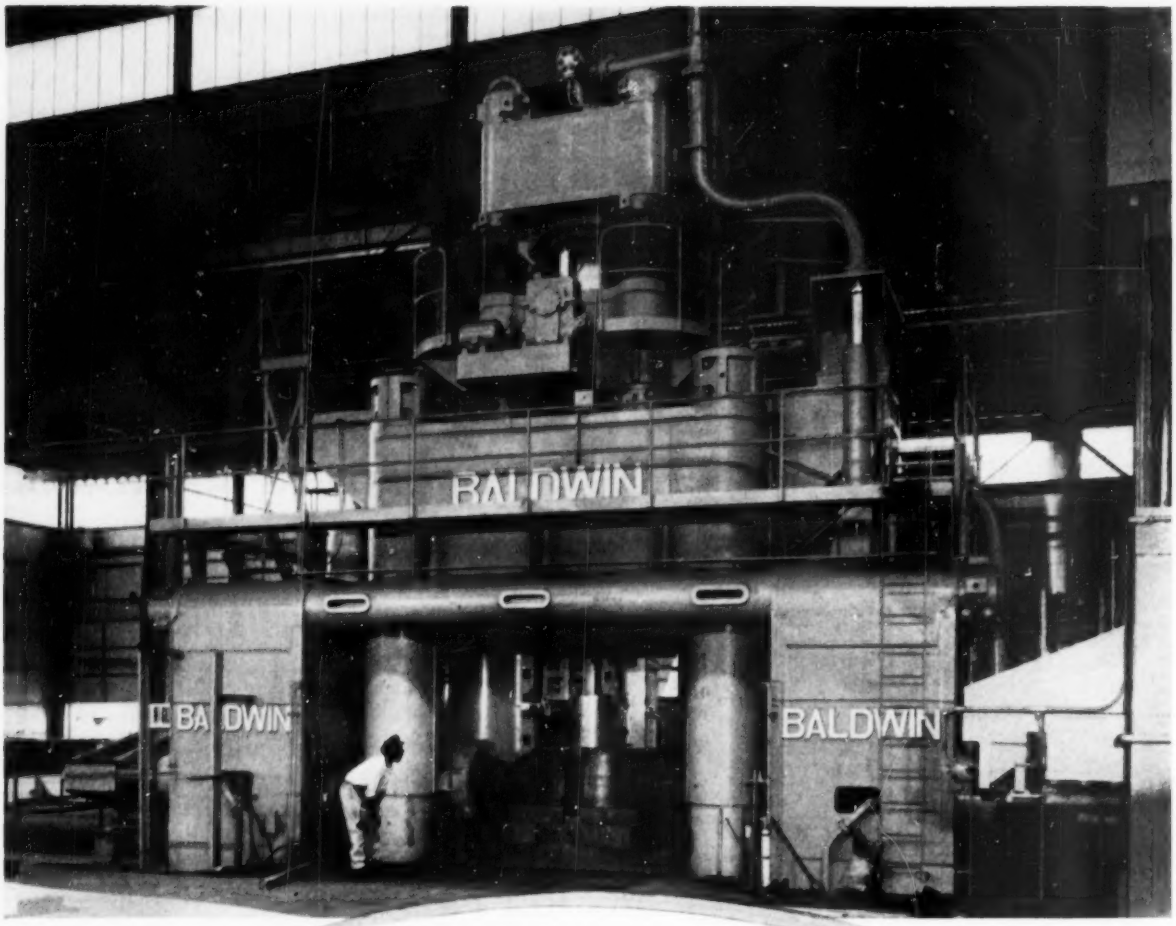
The problem of threading rectangular stock with an interrupted cut, is solved by the ACME HOB TYPE 5 die head. This special head insures three chasers always being in contact with the work. With the five die head illustrated, a guide is provided to compensate for the torque developed when threading rectangular stock. This adaptation of ACME Threading Equipment to difficult jobs, illustrates why the large percentage of pipe wrench manufacturers are using ACME Threading Machines today, replacing the obsolete thread milling method.



THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1207 W. 65th St., Cleveland 2, Ohio**
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES



A NEW ERA IN STEEL FORGING

BEGINS IN HOUSTON

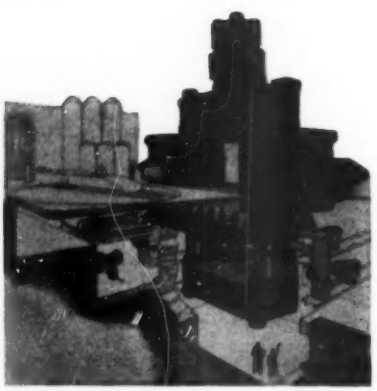
This new multiple ram forging press, the largest of its kind ever constructed, utilizes the Cameron Closed Die Extrusion Forging Process. The press forgings produced approach for the first time the broad field of intricate shapes that have been limited heretofore to steel casting. A new era begins in steel forging resulting in improved quality at a lower cost.

For further information write

FORGE AND ORDNANCE DIVISION

Cameron

IRON WORKS, INC.
HOUSTON, TEXAS



Main Ram — 11,000 Tons
Each Side Ram — 6,000 Tons
Piercing Ram — 3,000 Tons
Total Weight of Press — 3,100,000 lbs.

H. J.
Here's a really fantastic letter!
P.W.

BANNER TOOL COMPANY

BANNER tools DETROIT — *Fine* TOOLS FOR INDUSTRY

17243 FILER AVENUE - TWINBROOK 3-4900

DETROIT 12, MICHIGAN

June 16, 1952

Cities Service Oil Co.,
3049 E. Grand Blvd.,
Detroit 2, Michigan
Attention: Mr. P. E. Watts

Dear Sirs:

We called upon the services of your lubrication engineer, Mr. A. J. Blake, in reference to a serious staining condition which we were having with our soluble oil. He analyzed this condition and recommended one of your Chillo Oils. This oil was tried and the rust condition eliminated to our satisfaction.

To our surprise on his next visit he was dissatisfied with our tool life and suggested we use a soluble oil called "Chillo A". Now not only do we have clean machines, but tool life has been increased 20%! While in our plant he asked permission to "look around", which, of course, was granted.

We were using a tapping compound with precision ground taps in order to hold to close tolerances. We did not consider tap breakage excessive but the removal of broken taps was sometimes rather expensive. He recommended we use "Chillo 10Z". Then came the surprise of our lives! With Chillo 10Z we have gone to commercial ground taps (a 300% savings) and can still hold our same tolerances, with a sharper thread, increasing tap life a minimum of 20% plus eliminating expensive removal of broken taps!

We also have a production stamping job which required a new set of dies every month. On his recommendation we tried Chillo 10Z with these dies. Now our die life has increased to at least two months...a saving in die life of 100%, disregarding labor costs. We also increased production 200% per die sharpening!

We tried the same oil on our broaching operation and found that instead of making two cuts we can get the same results now with one. We were using one of your competitors' hydraulic oils and you told us it was a "good oil" and would give us satisfactory performance. BUT, GENTLEMEN, WITH THE EXCELLENT SERVICE YOU HAVE GIVEN, PLUS THE TIME AND MONEY SAVED, YOU MAY REST ASSURED THAT ALL OF OUR LUBRICATING REQUIREMENTS WILL BE PURCHASED FROM YOU.

Yours very truly,

BANNER TOOL COMPANY

S. F. Olesak

S. F. OLESAK

SFO:sd

Cuts them by the Dozen!

...AT A FASTER RATE

...FOR A LONGER TIME

...WITH LESS POWER

..... High speed steel, shockproof segments curl the chips out of the cut for cooler, smoother, faster cutting. Replaceable tooth segments provide an economical method of substituting worn-out teeth. Segmental cold saws are just one type in the complete Atkins line of metal cutting saws.

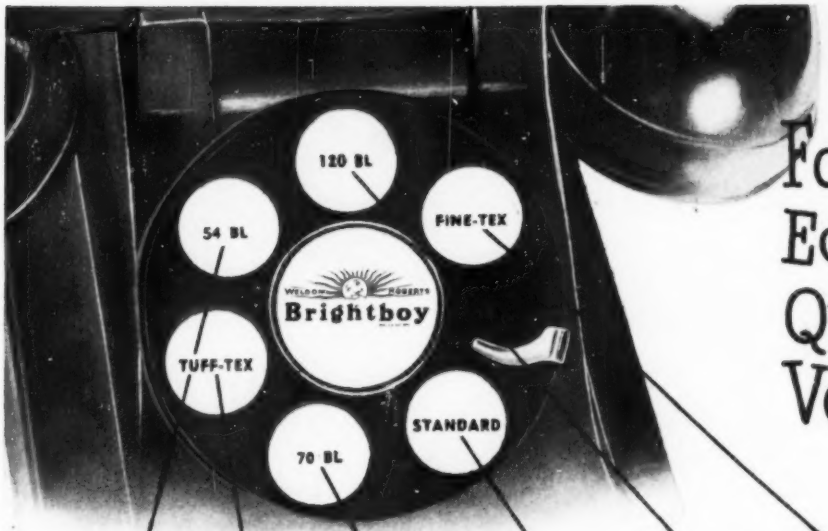
WHATEVER YOU SAW, THERE'S AN ATKINS SAW THAT DOES IT BETTER!

ATKINS Silver Steel SAWS

ATKINS

ATKINS SAW DIVISION
BORG-WARNER CORPORATION
INDIANAPOLIS 9, INDIANA

ENGINEERING B-W PRODUCTION



For New Economy... Quality... Versatility...

DIAL THESE BEST NUMBERS FOR MODERN FINISHING

54 BL
For faster finishing action on all metals.

TUFF-TEX
For finishing action on sharp burrs and edges.

70 BL
Wide range of finishing action on all metals.

STANDARD
General finishing action on all metals.

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Wide finishing range on medium-hard and soft metals; high polish on hard metals.

FINE-TEX
Polishing, finishing and burring soft metals; cleaning medium-hard and hard metals.

SEE - SAVE - PROFIT *- from Brightboy's almost unbelievable action!* This working combination of *special-texture, cushioning rubber and formula-matched abrasive* gives you a completely fresh concept of finishing — many, many applications beyond the limits of other methods.

You get smooth, fast finishing of stainless steels, forged aluminum, hard metals and all others and plastics, wood, glass, laminated materials. You can BURR, CLEAN, FINISH, POLISH, IN ONE OPERATION.

A TEST SOLVES YOUR PROBLEMS. Ask your dealer for the Brightboy sample card and Catalog-Manual. Write us if he cannot supply you, or on any problems where finishing is involved.

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co.
95 No. 13th Street • Newark 7, N. J.
America's Pioneer Manufacturer of Rubber Bonded Abrasives

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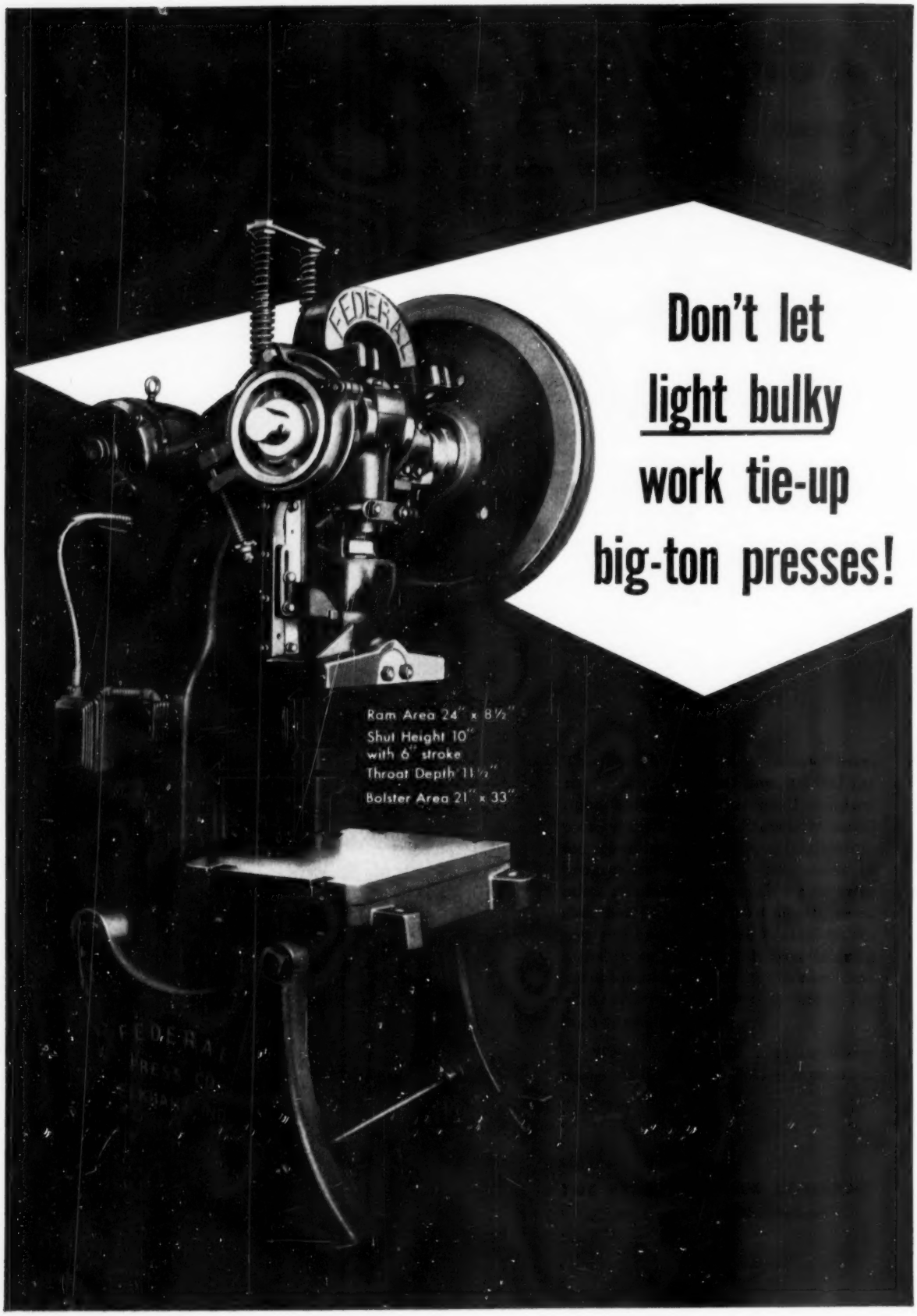
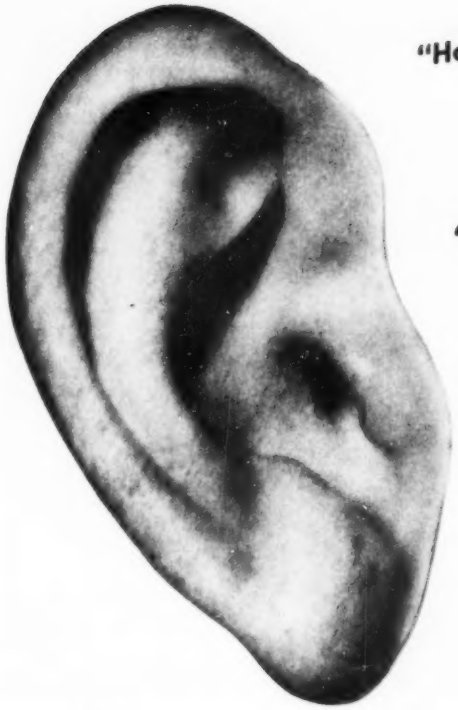
Brightboy
REG. U.S. PAT. OFF.
RUBBER CUSHIONED ABRASIVES


FEDERAL
Don't let
light bulky
work tie-up
big-ton presses!
Ram Area 24" x 8½"
Shut Height 10"
with 6" stroke
Throat Depth 11½"
Bolster Area 21" x 33"



"How can I get a faster quench?"

"What will step up my production on these grinders?"

"I need 15% more machining speed, with enough cooling"

"What will give me less rejects on these castings?"

"How can I prevent rust on these machined surfaces?"

"I need a drawing lubricant that will reduce press downtime"

Here is where to yell for help!

When you are being pressed because top brass is pushing for lower unit costs—or when you're determined to improve the efficiency of some operation—remember this Houghton Man's ear, and pour your troubles into it.

You'll get help you can *see* go to work—shaving nickels off single operations, chopping folding money from department production.

Here's why we, manufacturers of metal processing compounds, can promise this: Since our beginning we've been more than just suppliers. We have been *researchers*—digging into the whys and hows of such items as heat treating, casting, press forming, machining, cleaning, rust prevention. In each of these we have developed products *plus* the application methods that enable them to do a top job in their field.

We've been doing this for more than 80 years, and from our enormous backlog of experience, the odds are that we can find a cost-cutting answer.

In addition to the Houghton Man's own experience, he has a direct pipeline to the feedbox . . . quick access to all the Houghton information gathered over the years. Phone him now, or remember to see him the next time he is in your plant. You'll be glad you did! E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

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Try Houghton on these:

LUBRICANTS
For gears, spindles, hydraulics, moulds, high temperatures and general plant use.

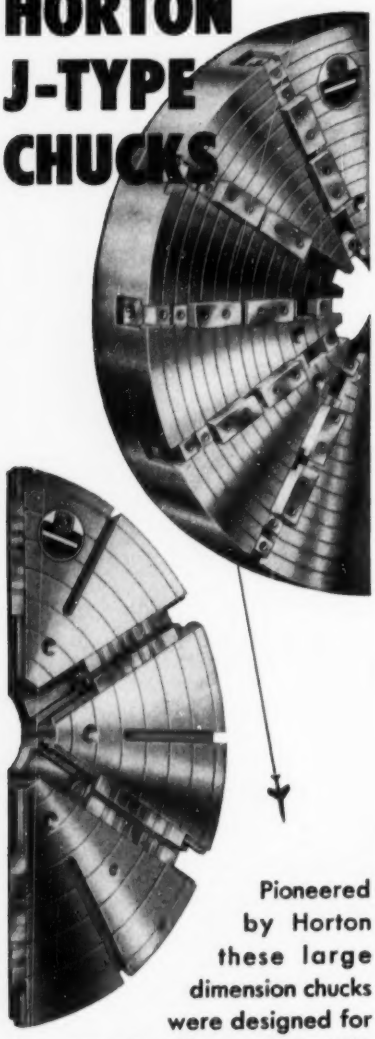
METALWORKING PRODUCTS
Cutting Oils and Bases • Drawing Compounds • Metal Cleaners • Rust Preventives • Foundry Core Binders • Salt Bath Materials • Quenching Oils • Surface Conditioners

HYDRAULIC PACKINGS
and Leather Belting

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

Ready to give you on-the-job service . . .

HORTON J-TYPE CHUCKS



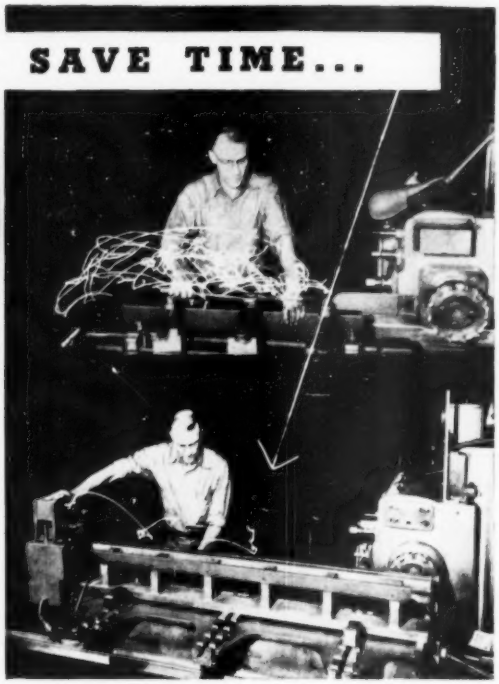
Pioneered by Horton these large dimension chucks were designed for the aircraft industry especially for machining various jet engine parts.

For 102 years Horton Chucks have kept pace with industry's demands.

HORTON CHUCK
Since 1851
DIVISION OF
THE E. HORTON & SON CO.
WINDSOR LOCKS, CONN.

HOW TO SAVE TIME...

by Eliminating Mechanical Clamping



Here's an interesting comparison between mechanical clamping and Sundstrand Magnetic clamping. The job is the same in both pictures. In the upper illustration .he part is held on the table with mechanical clamps. In the lower picture the same part has been located and clamped in a magnetic fixture. Lights attached to the operator's wrists show how excessive motion has been eliminated with the Sundstrand magnetic fixture.

There are other benefits available from magnetic clamping: longer tool life, more uniform clamping and elimination of operator's fatigue are a few. There are more. Investigate.

FREE DATA

is available on Sundstrand magmetic clamping fixtures. Write today. Ask for bulletin 136-M.

SUNDSTRAND POWER-GRIP ®

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Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1050-9th ST. • ROCKFORD, ILLINOIS

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Just connect the BUZZER High Speed Muffle Furnace to your gas supply and it is ready for use. A temperature of 2400° F. is attainable in approximately 1½ hours. Special block for controlled furnace atmospheres make this furnace particularly adaptable for high carbon and alloy steels. Special BUZZER burners have wide range of control.

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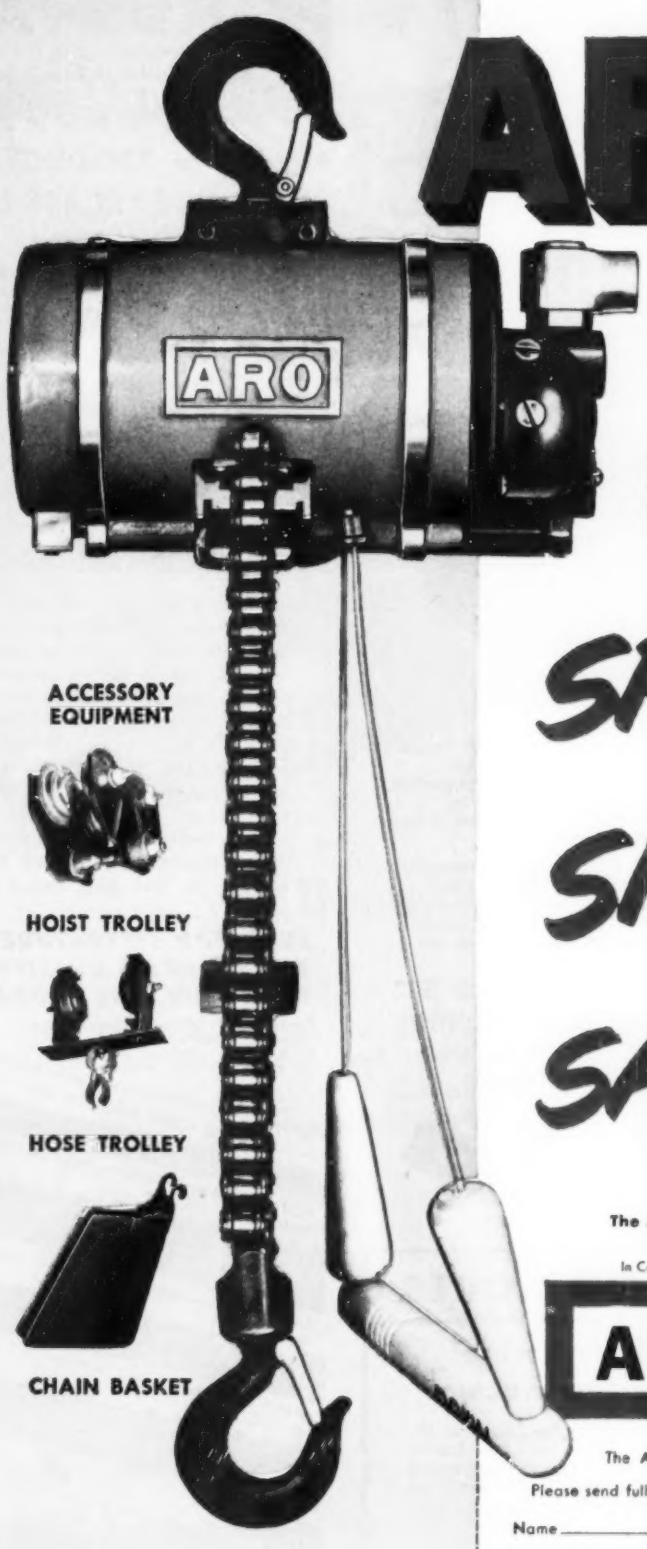

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Overall length 10¼" weighs only 28½ lbs.

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Betters all safety requirements!

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HOSE TROLLEY

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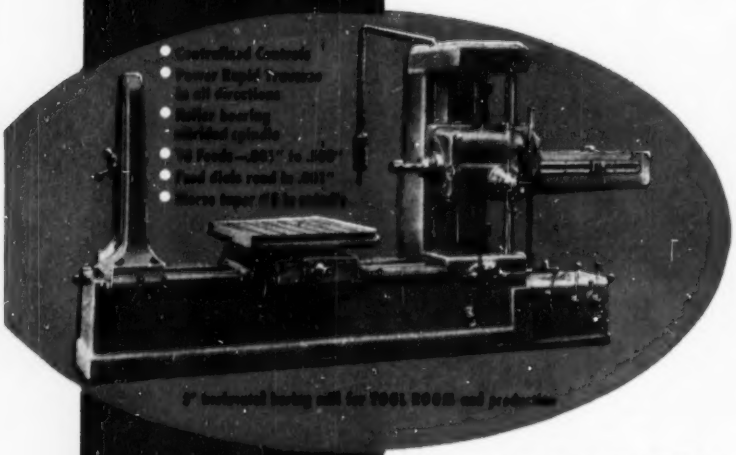
3" horizontal boring mill for TOOL ROOM and production

table top swivels full 360°

18 speeds—17 to 910 r.p.m.



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over 75 years of "know-how" in the manufacture of precision production machinery

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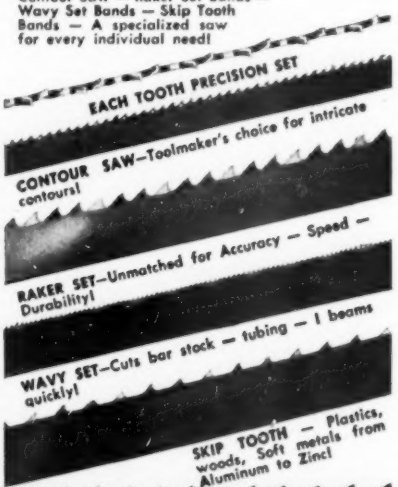
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Here is a scale model of the production line area of one of the most modern automobile engine plants ever built. Having a capacity of 100 V8 engines per hour, it is equipped with time-and-money-saving machinery for automation.

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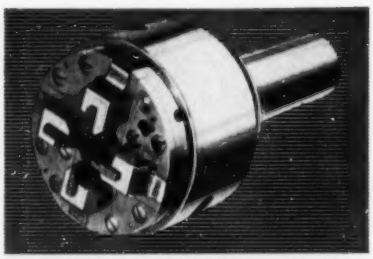
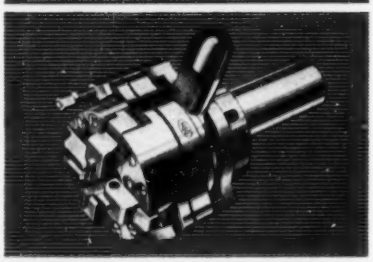
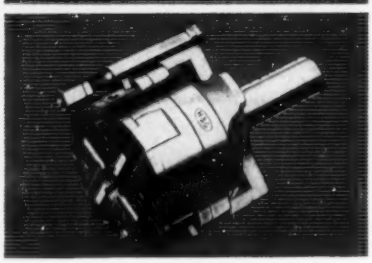
An IDLE man at a BUSY automatic spells PROFIT. ¶ A BUSY man at an IDLE machine spells LOSS. ¶ H&G Insert Chaser Die Heads are preferred by screw machine engineers because they spell less down time, lower costs, cleaner, more accurate threads.



Style MM
for multiple spindle automatics, chucking machines, drill presses.



Style DMS
for hand screw machines, turret lathes, where die head does not rotate.



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WRITE FOR "HOW TO SELECT THE PROPER DIE HEAD FOR THE JOB".

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CARBIDE-TIPPED
SHELL TYPE EXPANSION REAMER*

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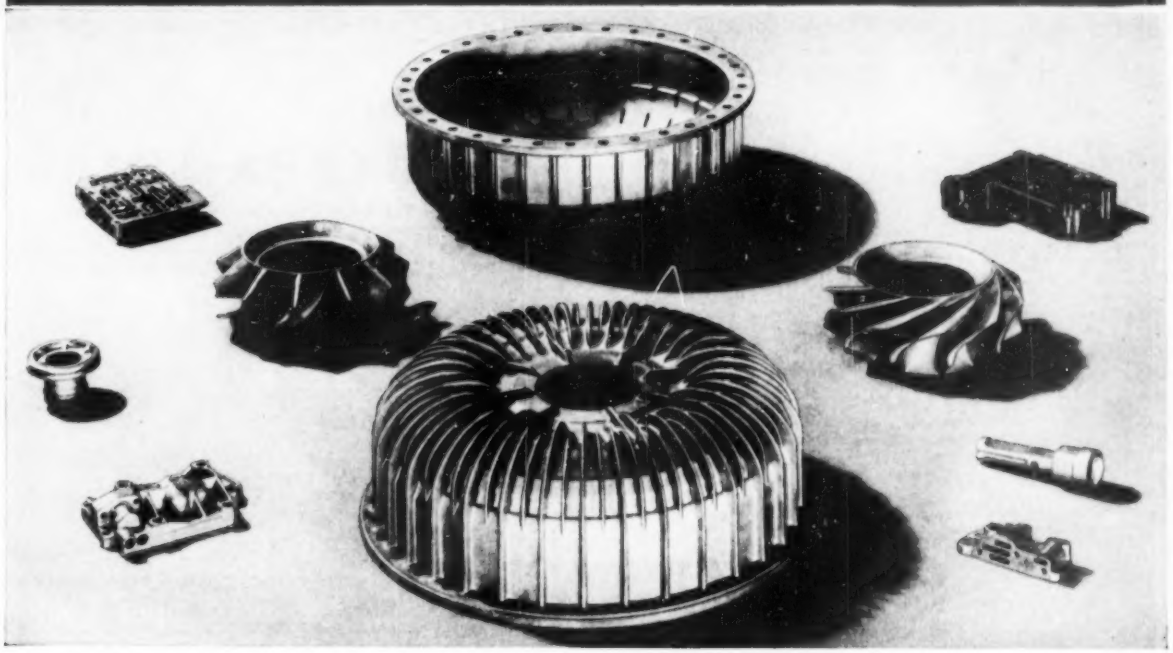

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15 MODELS
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JOHNSON Bonus Built
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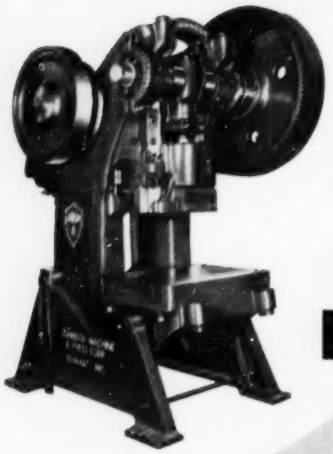

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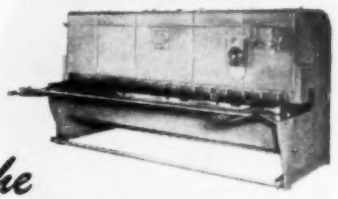
for mild steel up to 10 gauge



the HYDRA-SHEAR

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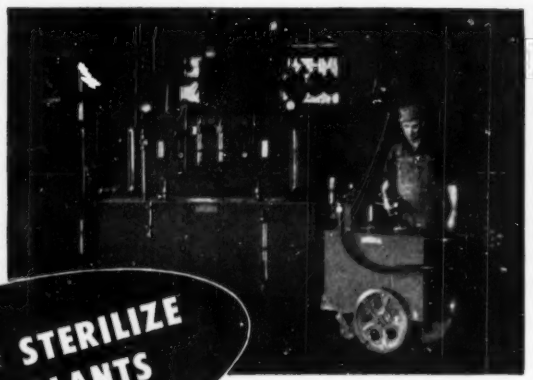

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ADJUSTABLE TOOL HOLDER

Exclusive vise grip jaw runs full length of cutter channel... hugs bit so it can't rock, chatter, slip, sag or break... *permits faster feed, deeper cuts!* Holds all sizes—square, round, undersize or narrow bits for cutting off or special forming operations. Also available with 15° cutter channel for H.S.S. tool bits.

SPECIFICATIONS

Model	Size	Tool Capacity
P-60	0	1/8 to 5/16
P-61	1	5/16 to 3/8
P-62	2	1/4 to 1/2
P-64	4	5/16 to 5/8

Specify left or right hand offset

For complete information call your Clark Cutter Jobber now or write Factory A

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Manufacturers of Precision Cutting Tools

The proud papa is B. F. Michtom, Chairman of Ideal Toy Corporation, but . . .

Do you recognize his famous family?

They're all celebrities except the happy "father"! He's B. F. Michtom, who built a $25,000,000 business promoting "character" dolls inspired by famous personalities. He's holding Saucy Walker and Harriet Hubbard Ayer. The others are Mary Hartline, the Toni Doll, Shirley Temple, and Smokey Bear, protégé of the U. S. Forest Service.

"Real-life stars create plenty of excitement when they appear at famous stores," says B. F. Michtom. "But to cash in, we have to get the dolls on the counter *on time*. We call Air Express. Frantic telegrams come in: 'Sold out. 1,000 kids in store. Send more dolls!' We keep both kids and stores happy — we call Air Express again!

"Stores need mat ads. They run out of autographed photos, Jr. Forest Ranger application cards and similar promotion materials. Air Express fills the gap fast.

"Nobody needs Air Express more than we. It's indispensable. Yet we pay no premium for this superior service. In fact, Air Express rates are *lowest of all* on most of our shipments."

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

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GETS THERE FIRST *via U.S. Scheduled Airlines*

DRILL HEADS Expertly Designed

to Fit YOUR Needs For...
DRILLING • TAPPING •
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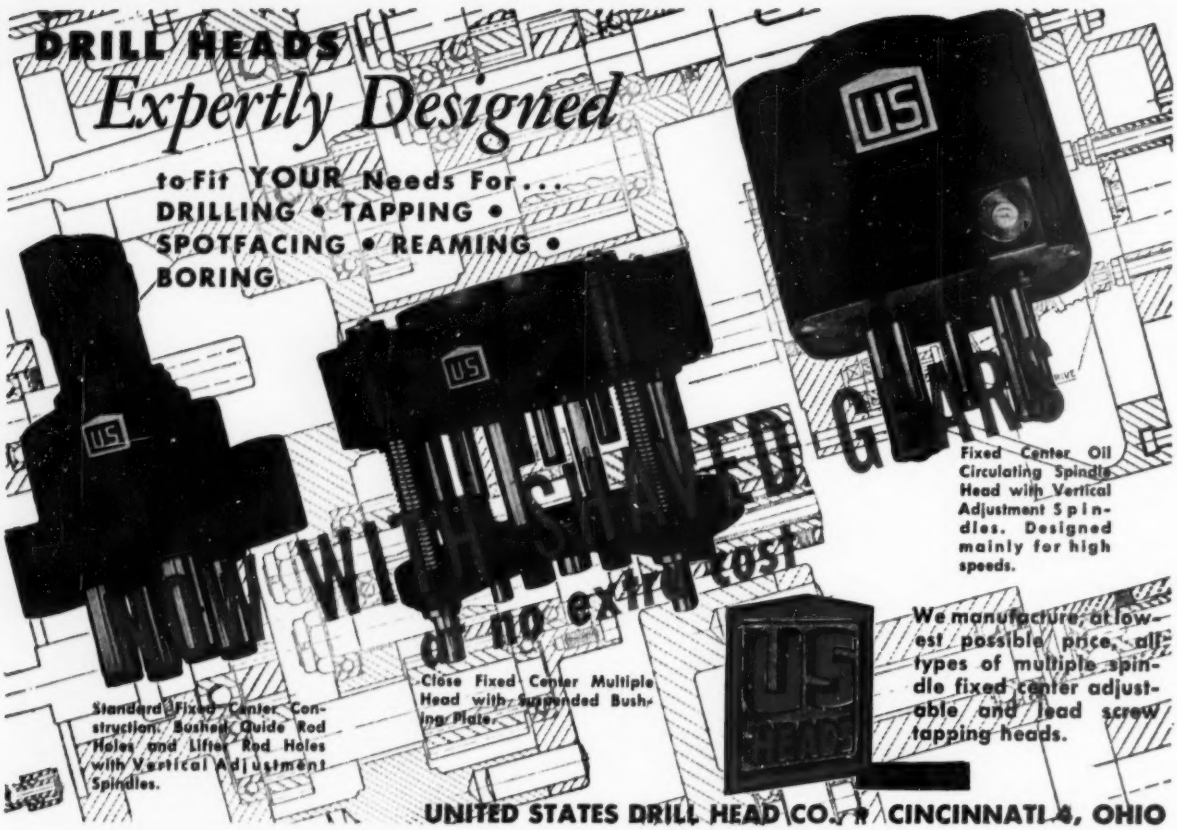

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We manufacture, at lowest possible price, all types of multiple spindle fixed center adjustable and lead screw tapping heads.

Standard Fixed Center Construction. Bushed Guide Rod Holes and Lifter Rod Holes with Vertical Adjustment Spindles.

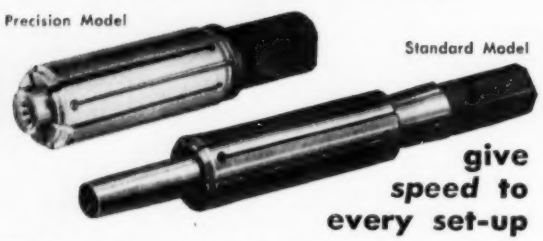
Close Fixed Center Multiple Head with Suspended Bushing Plate.

UNITED STATES DRILL HEAD CO. • CINCINNATI 8, OHIO

CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

Precision Model

Standard Model



give speed to every set-up

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from ⅛" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from ½" to 9⅛" diam.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.*

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There's a Walker Magnetic Chuck for Every Known Application . . .

For sixty years, Walker has specialized in the designing and production of magnetic holding devices. Today, Walker produces a complete line of magnetic chucks and designs special chucks to meet unusual holding problems.

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O. S. WALKER CO. Inc.
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Original Designers and Builders of Magnetic Chucks

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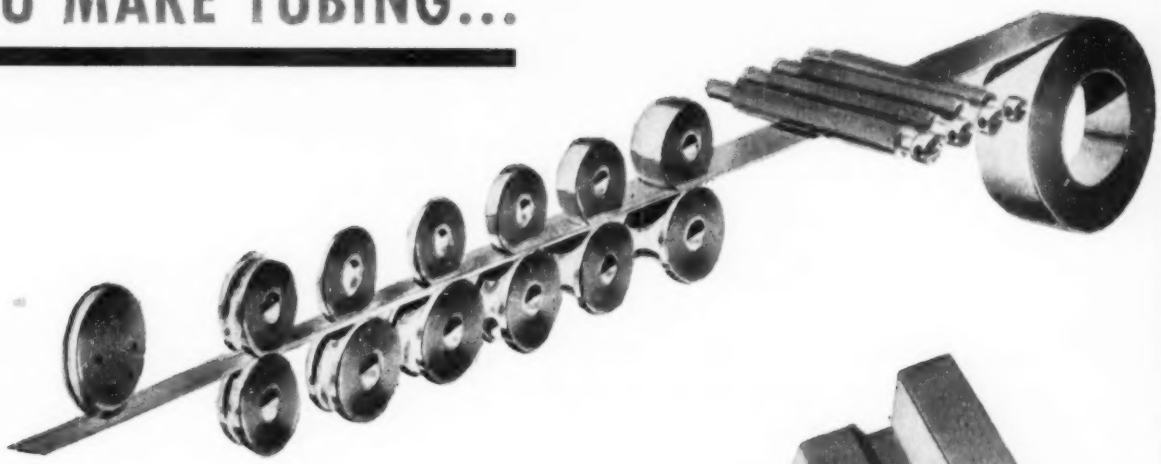
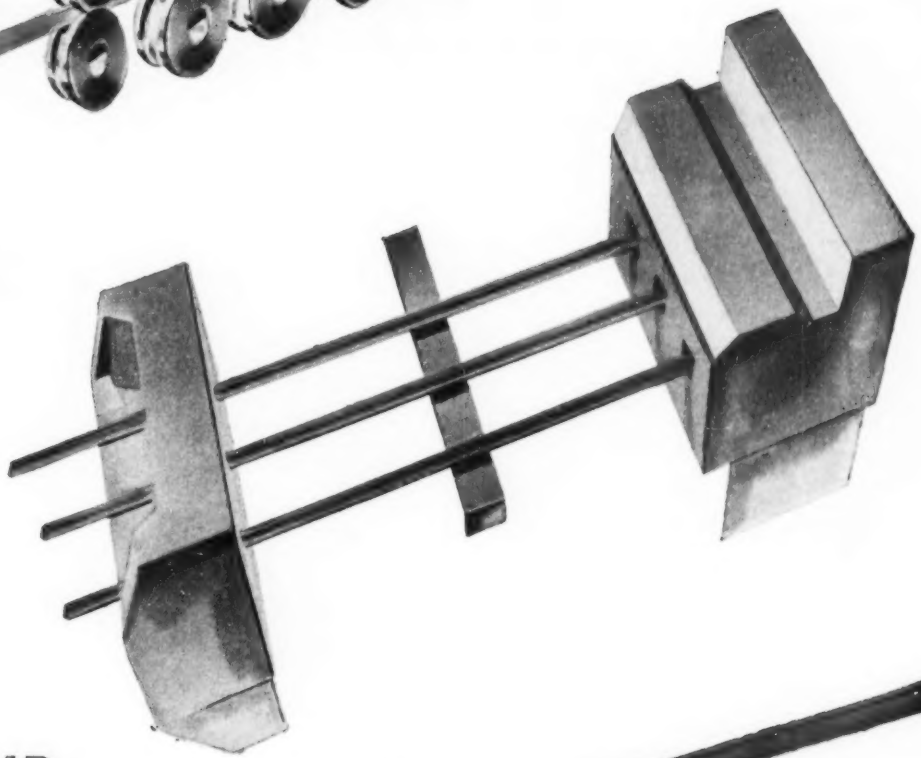


DRAW IT...



OR CUT IT UP...

YOU SHOULD KNOW McKAY

One of the world's foremost designer-producers of tube mills, tube drawbenches, and tube cut-up equipment . . . serving the automotive fabricating and steel industries. If your business is tubing, McKay should be high on your list of standard and special equipment suppliers.

The McKAY MACHINE *Company*
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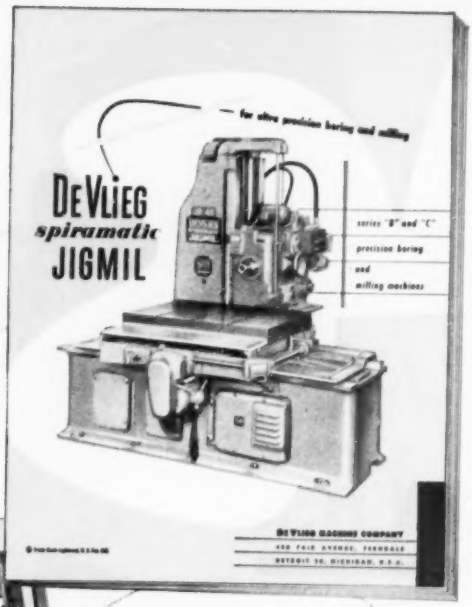
Brings you a new comprehensive Catalog featuring the latest range of Spiramatic Jigmil Precision Boring and Milling Machines . . .



Precision plus Production

A request on your company letterhead will bring a free copy of this catalog!

for the latest developments in precision boring equipment . . . consult **DEVLIEG OF DETROIT**

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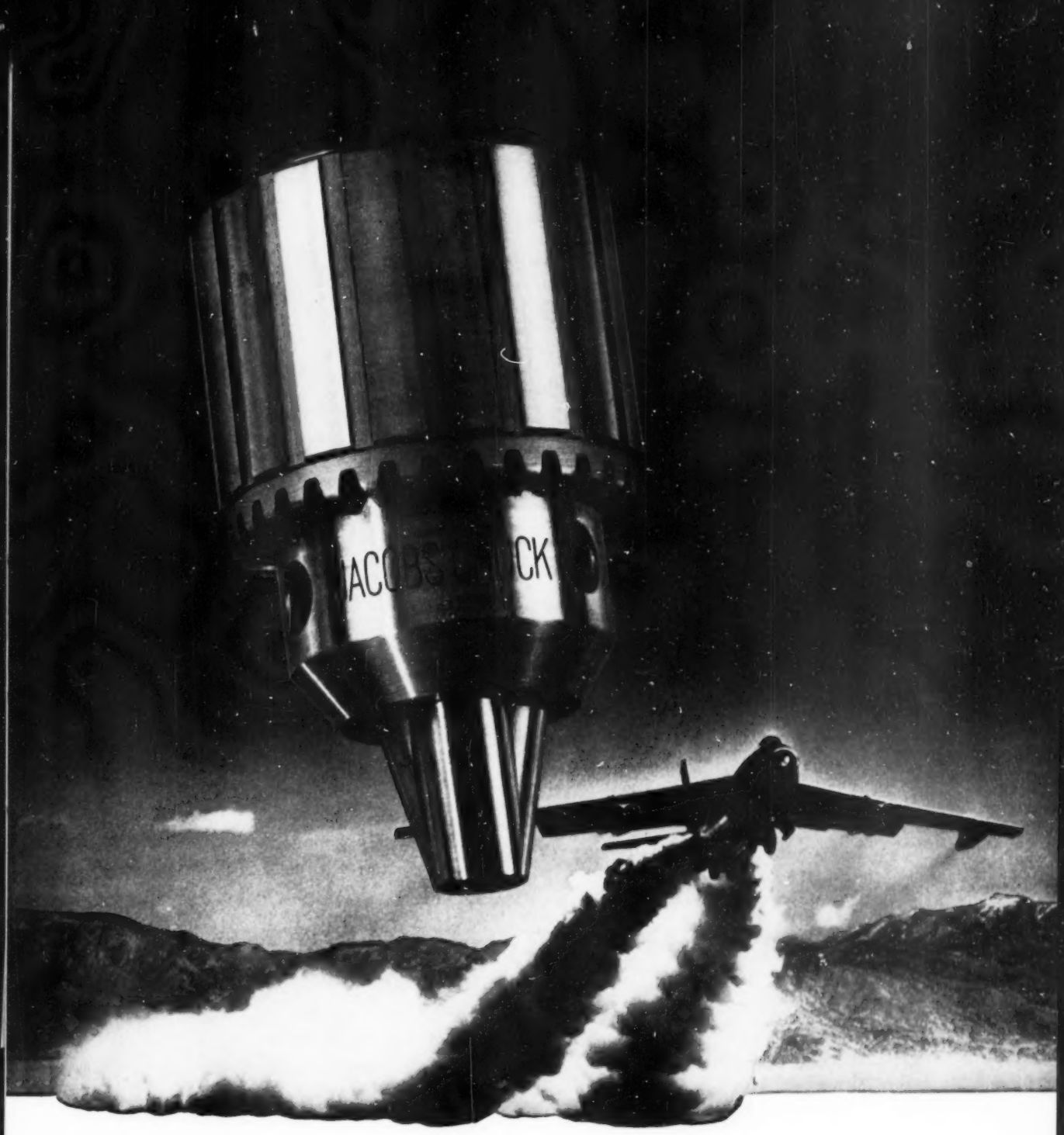

EXTRA POWER *for top performance*

In A Jet Plane, rockets supply the extra launching power needed for fast-climbing takeoff. In industry, Jacobs Plain Bearing Chucks supply the extra gripping power vital to top performance in light- and medium-duty drilling. This, plus rugged construction and precision accuracy, makes them the world's most widely used chucks.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A JACOBS IT HOLDS

Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

. . . first in chucks
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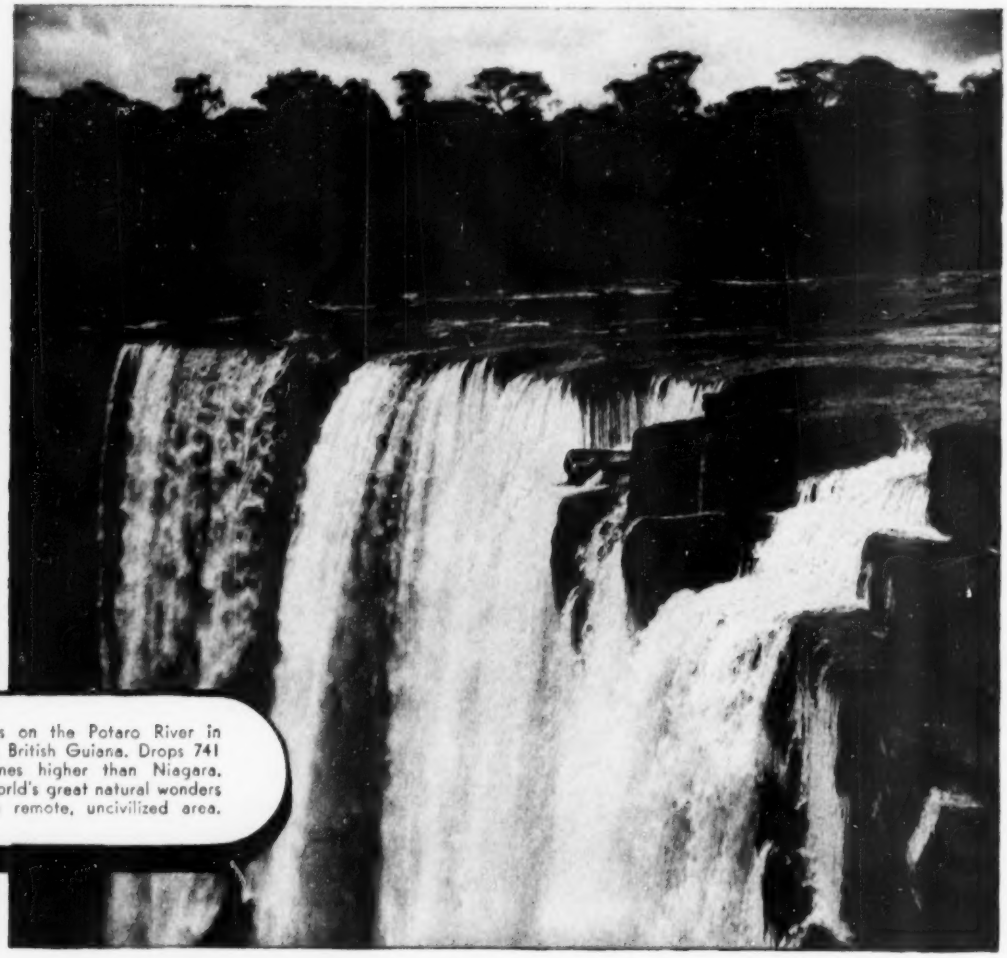
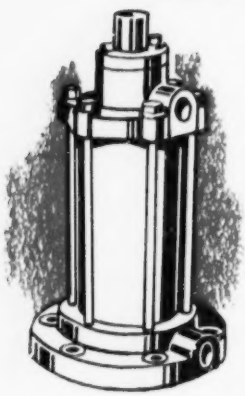
LOGAN FLUID POWER • DURABLE, DEPENDABLE SINCE 1916



Kaieteur Falls on the Potaro River in West Central British Guiana. Drops 741 feet—five times higher than Niagara. One of the world's great natural wonders situated in a remote, uncivilized area.

LOGAN HYDRAULIC CYLINDERS



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Eight standard sizes from 2" to 8" diameter bore. Maximum operating pressure 750 p.s.i.

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Seven standard sizes from 3" to 14" diameter bore. Maximum operating pressure 500 p.s.i.

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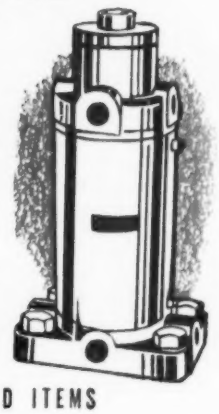
7 STANDARD MOUNTINGS

Sizes from 2" to 8" bore; any length stroke up to 8 feet as standard. Four piston rod end types. Operating pressures to 1500 p.s.i.

Consult Logan for your special heavy-duty, mill-type cylinder requirements



LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS

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SAVES TIME — Logan — AIR AND HYDRAULIC EQUIPMENT — REPORT • MOTION

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a good name to Know . . a good place to Go

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Impco Straighteners

Tailor-Made and Precision-Built For

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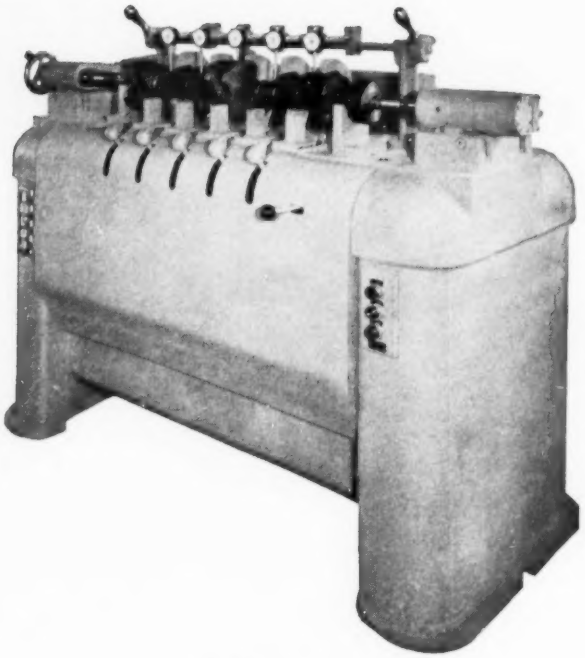
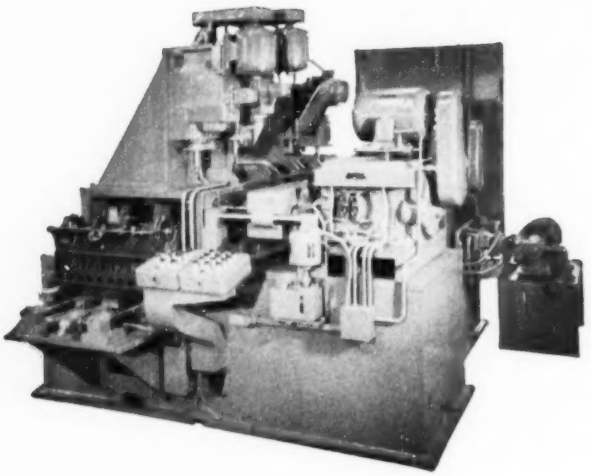
- TRANSMISSION SHAFTS
- OTHER PARTS OF THIS TYPE



IMPCO Shaft Straighteners incorporate a new principle which straightens shafts by pulling downward instead of pressing the point of runout. A battery of dial indicators makes it possible to locate IMMEDIATELY the amount of greatest runout. These indicators, which can be mounted on a common swivel bracket or on anvils with ample over-travel, are so located that they will not be harmed by loading or straightening of the part.

ALL IMPCO Straighteners are driven by means of a hydraulic double vane rotary cylinder. A convenient filler and large cleanout for the hydraulic oil tank are located on the back side of the machine. Moving parts are encased below the working surface for greater safety and compactness. Tailor-made to customer specifications, IMPCO Straighteners are designed to meet special production needs with consistent accuracy, speed, and efficiency.

CUSTOM-BUILT MACHINES to Fit Your Needs



This automatic transfer machine used for drilling, tapping, and trepanning, was built to specification for a leading automobile manufacturer. It handles 60 cylinder blocks per hour net. We offer it as one example of how IMPCO can solve a particular machine problem. Remember, IMPCO will design plans for you, work from your own prepared specifications, or modify existing machines to meet your specific needs.

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There's only ONE TAPER-LOCK

TAPER-LOCK sheaves run true! The patented Taper-Lock bushing grips the shaft for the full length of the bushing—holds with the firmness of a shrunk-on fit!

Every belt pulls its full share of the load. Grooves, machined on precision equipment, have identical pitch diameters, assuring equal belt tension.

Easy on—Easy off. Slip it on the shaft, line it up and tighten while sighting. In ease and speed of mounting and demounting you'll appreciate there is only ONE Taper-Lock.

No flange, no collar, no protruding parts. Flush hub means safety.

Taper-Lock sheaves are available from distributors' stocks in complete range of sizes in A, B, C and D grooves.

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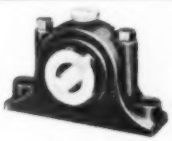
100 UNION STREET, MISHAWAKA, INDIANA

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone book.



DODGE-TIMKEN PILLOW BLOCKS

TORQUE-ARM SPEED REDUCERS

ROLLING GRIP AND DIAMOND D FRICTION CLUTCHES

NAME PLATES

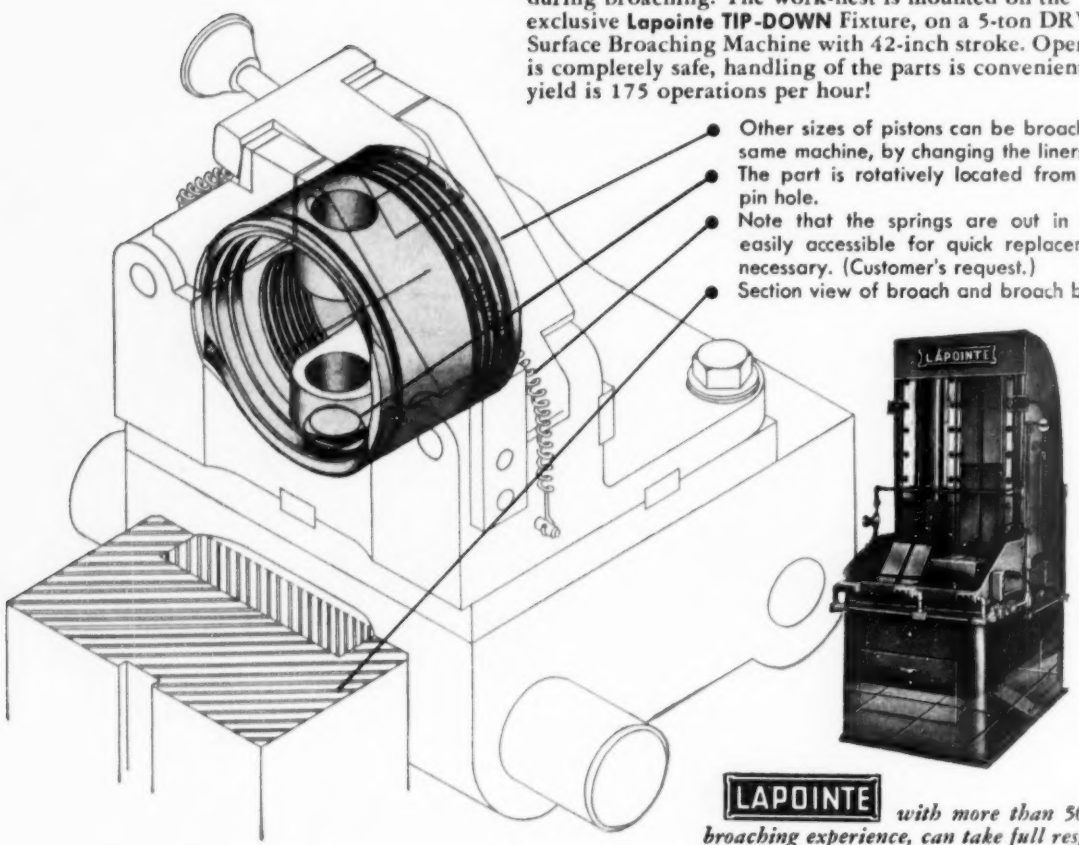
FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 N. SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

LAPOINTE SURFACE BROACHING

. . . the most economical method of metal removal for high production!

This piston is a good example of what can be done by **LAPOINTE** surface broaching. A "contour cut" is broached crosswise, across the end . . . with the piston firmly held in a fixture of unique Lapointe design.

We call it a shroud. Our engineers developed this quick-acting fixture to encompass the part and prevent distortion during broaching. The work-nest is mounted on the exclusive **Lapointe TIP-DOWN** Fixture, on a 5-ton DRV Surface Broaching Machine with 42-inch stroke. Operation is completely safe, handling of the parts is convenient, yield is 175 operations per hour!


Other sizes of pistons can be broached on the same machine, by changing the liners.
The part is rotatively located from the wrist-pin hole.
Note that the springs are out in the open, easily accessible for quick replacement when necessary. (Customer's request.)
Section view of broach and broach body.
LAPOINTE

LAPOINTE *with more than 50 years of broaching experience, can take full responsibility for designing and building the machines, tools and fixtures to suit your requirements. For information,*

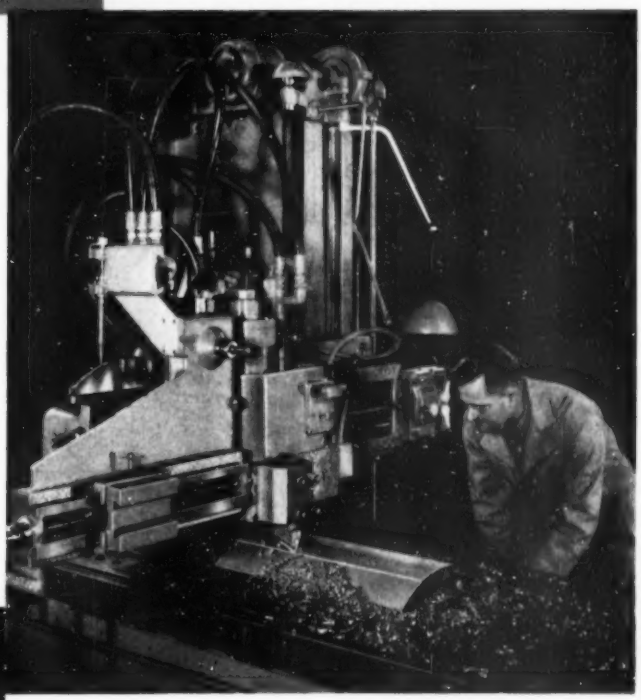
write for Bulletin **DRV 2**

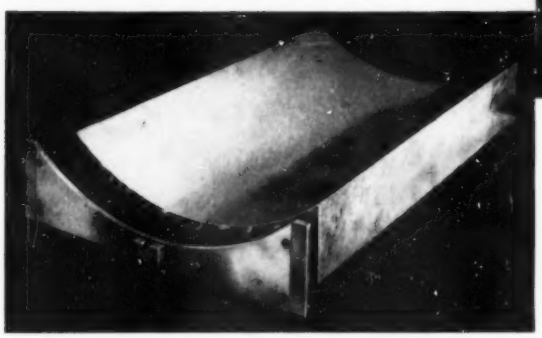
THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

use KOPY-KAT duplicating

TO
SIMPLIFY
FORM
MACHINING





Kopy-Kat duplicating is a fast, inexpensive way of reproducing identical forms. No expensive templates are needed. Forms are transferred direct.

For the L & W Tool & Manufacturing Co. at Milwaukee, Wisconsin, a Rockford Kopy-Kat machined a mold within limits of ± .002", using a simple flat stock template. They found the surface finish to be excellent, and the best obtained compared with any other method.

The entire machining time, including set-up for both work and template, was 39 hours floor-to-floor for both parts of the mold. The above illustration shows the convex part of the mold being machined. The concave part and the template are shown in the closeup view.

See the Kopy-Kat in action before selecting production duplicating equipment. A Rockford Machine Tool Co. representative will give you complete information.

Write for
Bulletin No. 12A

Hy-Draulic

ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET ROCKFORD, ILLINOIS

One-Stop shopping

for brass rod and bar

You can get rod or drawn bar of Chase Free-Cutting Brass, Copper or a wide variety of other copper alloys at one stop – *the Chase Warehouse nearest you!*

When you want free-cutting materials, it pays to buy Chase – for Chase rod and drawn bar yield the shorter chips that make for *easier machining, longer tool life*. They produce smooth, clean-surfaced products – less expensive to buff or polish before lacquering, enameling or plating.

And when it comes to re-ordering, remember that Chase alloys are uniform – repeat orders of the same alloy always have the same cutting characteristics.

Chase BRASS & COPPER

The Nation's Headquarters for Brass & Copper

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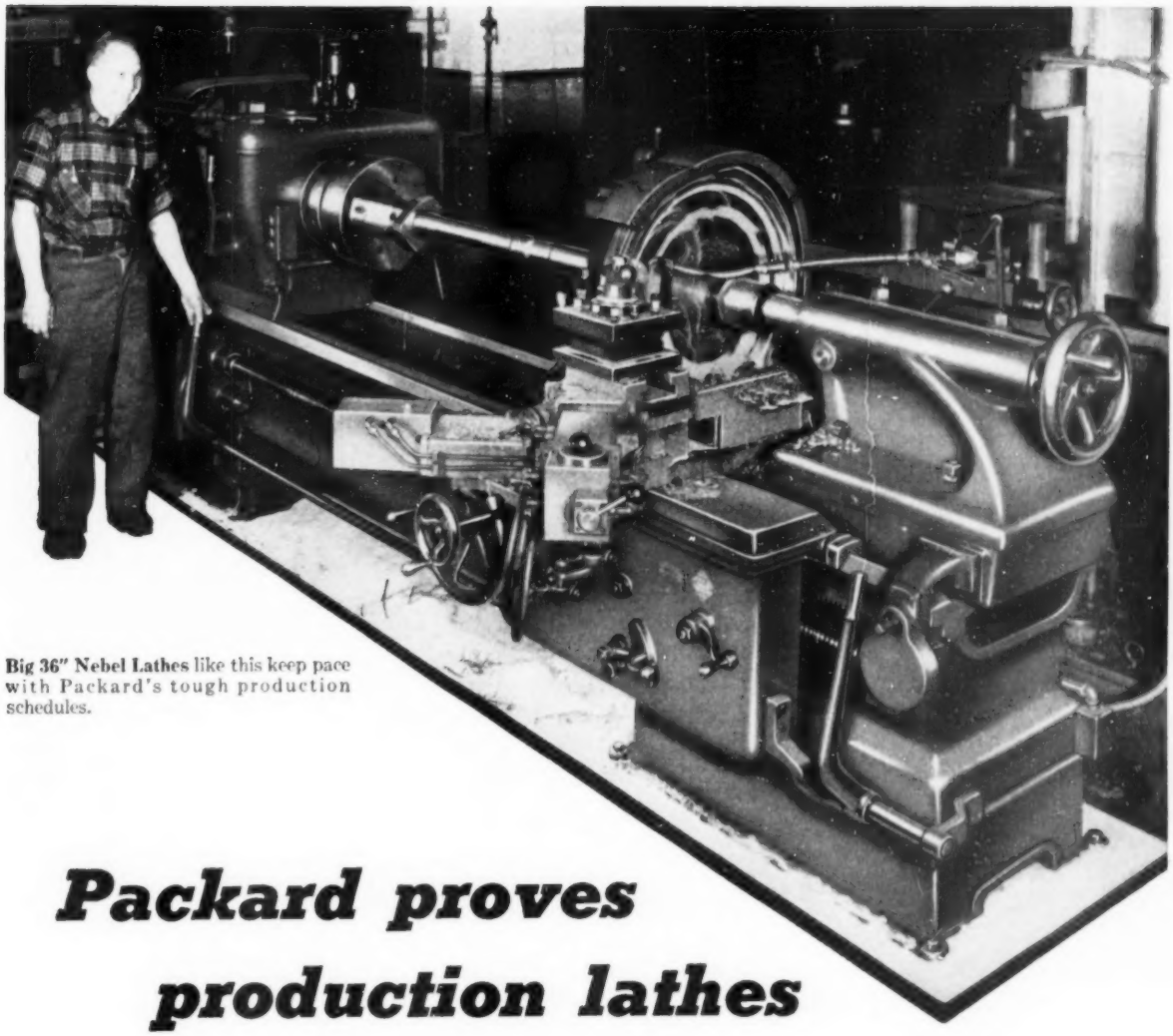


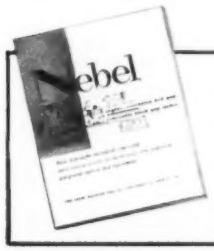
Big 36" Nebel Lathes like this keep pace with Packard's tough production schedules.

Packard proves production lathes needn't be expensive!

Packard Motor Car Co. uses 8 Nebel heavy duty engine lathes—*with precisely the right combination of Nebel attachments* necessary to produce jet engine turbine wheels and shafts.

Nebel lathes are like that: they're basic. They aren't loaded with expensive "extras" you may never need. Yet you can add attachments and accessories *you need* at any time. That's why Nebel lathes—heavy duty engine, removable block gap and extension bed gap—are your very best lathe buy.

Nebel's a natural for maintenance or production. Write for descriptive catalog today. The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A. Members of the National Machine Tool Builders' Assn.

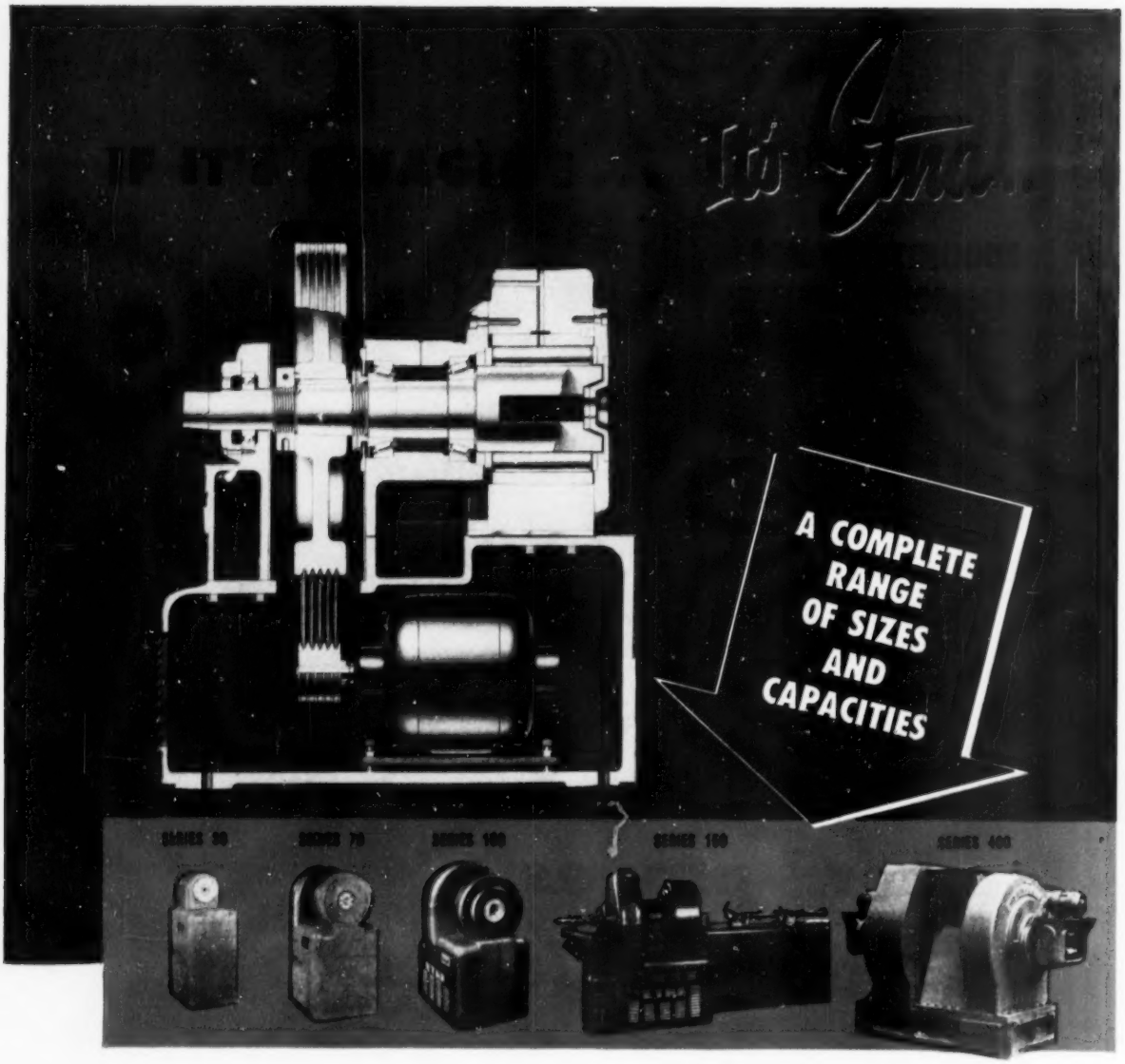


SEE WHY
NEBEL'S YOUR BEST LATHE BUY!

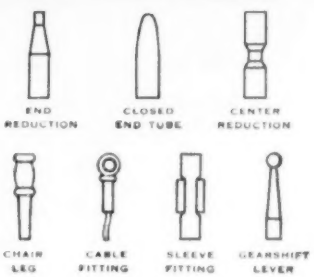
Powerful 20-page booklet tells you how a lathe can be so good and yet cost so little. It's yours without obligation. Send for it today.

Nebel

the workhorse of the metal-working shop since 1899



For tapering, sizing, reducing and forming to special shapes of round solids and steel tubing, the Etna Swaging Machine offers the ultimate in modern machine design. Regardless of size and description of the job to be done, there's an Etna swager right for *greater production*. Write today regarding your specific job problems.



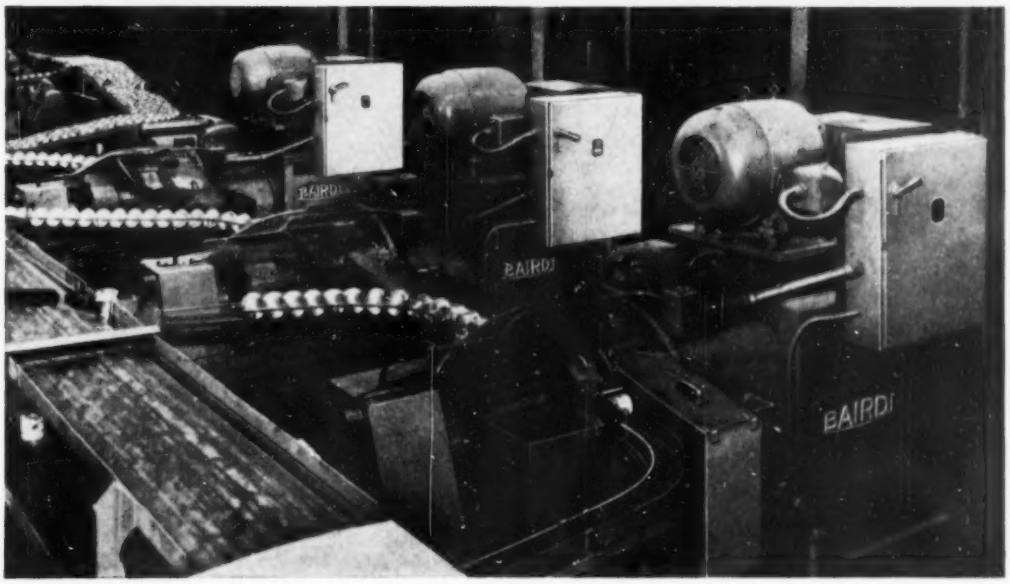
It's New! Get full information on removal of I. D. Bead on steel and stainless steel tube with Etna Swagers resulting in mirror finish. Bead also removed on conduit.

Abbey ETNA Company

3404 MAPLEWOOD AVE., TOLEDO 10, OHIO

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING



BAIRD *Automatic* CHUCKING MACHINES
Join mass production lines at new FORD plant

The Baird Machine Company is pleased to share, with other manufacturers of modern automatics, in the high speed production at the Ford Motor Company's new Cleveland Engine Plant.

Shown above is a battery of Baird Chucking Machines. They completely finish-turn the engine piston, and finish the oil ring grooves to size. Machines are automatically loaded from the conveyor and automatically discharge the pistons when they are completed. Operations are fast, continuous, and to close-tolerance machining.

The Baird 76H Chucker (7"-chuck, 6-spindle, horizontal machine) combines, in a single automatic indexing cycle, such operations as turning, facing, drilling, tapping, threading, grooving, and chamfering . . . if desired. Automatic electrical and mechanical safety devices prevent damage when setting up, when loading is not within cycle time, or when any motions are out of sequence.

Other valuable features are: easy access to all tooling, individual tool slides, individual spindle speeds, automatic chucking, maintained accuracy over a long service life.

If you require repetitive production of this nature . . . either hand load and unload, or entirely automatic . . . ask Baird engineers for details.

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc. 738 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

ACHIEVING PERMANENCE OF ACCURACY

Just as important as the initial accuracy of a precision machine tool is the *life expectancy* of this accuracy. And the most effective way to insure long-lasting accuracy is to give *dimensional stability* and *wear resistance* special consideration during machine design.

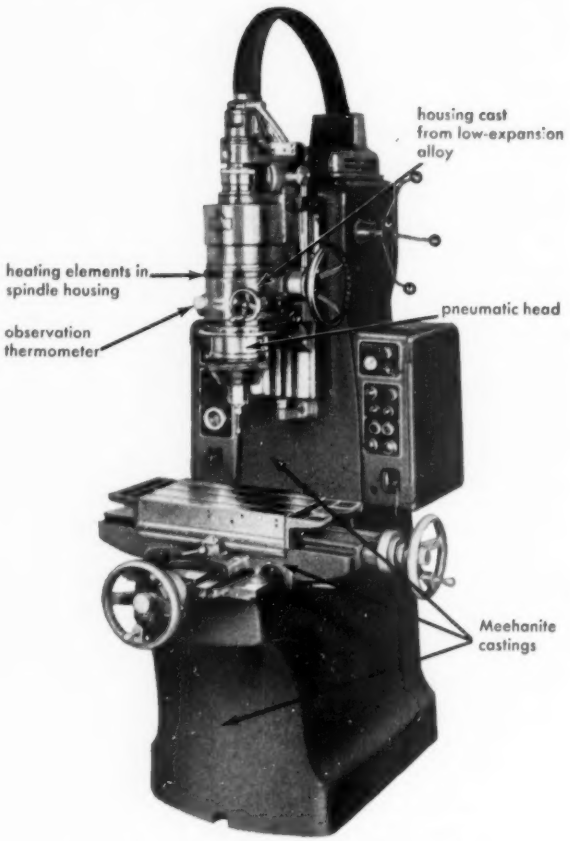
The following causes of dimensional *in*stability are most frequently encountered: thermal expansion, unstable constituents in the material; and stresses in the material. In the design of the No. 2 Moore Jig Grinder, all of these factors were taken into account and special features were incorporated to counteract them.

All the inherent accuracy of a measuring system, capable of positioning the workpiece in relation to the spindle within a tenth, is rendered nearly valueless if the spindle does not retain its position during machining operations. Such movement, caused by thermal expansion, is inevitable unless steps are taken during design to minimize or prevent it.

Electric heating elements were incorporated in the main spindle housing of the Moore Jig Grinder to maintain uniform temperature—whether machine is running or not. An observation thermometer is located so as to indicate any abnormal temperature change within the housing. The housing itself is cast from 36% nickel iron to further minimize effects of temperature variations. And a pneumatic head directs air onto the workpiece, preventing undue temperature rise both in the workpiece and in the locating members of the machine.

Instability resulting from gradual relaxation of locked-in stresses in castings is prevented by suitable stress-relieving cycles during the manufacture of Moore machine components. Similarly, the best way to avoid unstable hardened steel parts is by tempering them. Moore follows this practice.

Further wear resistance was built into the Moore Jig Grinder by means of: adequate way and bearing surface, scientifically proportioned to minimize and distribute wear; all reciprocating parts of nitrided steel—almost as wear-resistant as carbide; pressure lubrication of ways; lead screws and nuts made from nitrided steel and aluminum bronze, respectively, combining to offer low coefficient of friction, abrasion resistance and hardness; and dust protection devices.



Special design features of the No. 2 Moore Jig Grinder insure permanence of accuracy.

ACHIEVING GREATER ACCURACY QUICKLY is the job of Moore Jig Grinders and Moore Jig Borers. Both make possible accurate lead screw settings within .0001". This team will produce precision holes, contours and surfaces *in your shop* at minimum cost. For detailed catalogs, write to: Moore Special Tool Company, Inc., 738 Union Avenue, Bridgeport 7, Conn.

(Advertisement)

A GOLD MINE OF

Job-Proved, Cost-Cutting, Production Helps

Methods and Production Case Records on a wide range of actual operations

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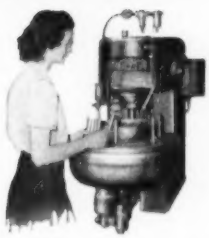
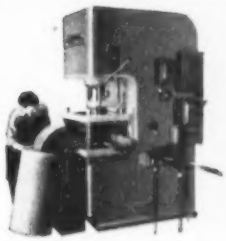




See how *others* cut costs with

MULTIPRESS®

Facts and figures from hundreds of actual users tell *how* and *why* the smooth oil-hydraulic power and control of Multipress cuts production costs. Our Data Log reports on these applications may offer better answers to some of your own production needs.

Multipress offers complete adjustability of ram speed, pressure and stroke length.

Pressures build up instantly as the ram contacts the work . . . there's no hammer-blow impact on work or tooling.

With Multipress Index Table Feeds, work can be loaded on multiple fixtures that index to the press ram automatically at speeds up to 70 per minute — often keeping two or more operators busy at top speed.

Automatic time delay, for ram dwell or hold-down, is easily provided with Multipress.

Many other types of valving, ram controls, auxiliary feeds, operating accessories and tooling attachments can be interlocked with the Multipress ram action. Let us send you full details on Multipress.

Write Today for Data Logs on types of operations your production requires.

DENISON Hydr OIL ics

TRADE MARK

The DENISON Engineering Company **1164 Dublin Road, Columbus 16, Ohio**

PARTS LIKE THESE

are produced better . . . at lower cost *by* ALLIED'S COLD FORGING METHODS

Shown at the right in actual size is one of the many cold forged parts being produced by Allied.

By no other method could this particular part, or any of the other parts illustrated above, be manufactured as economically as by cold forging. However, to produce such parts requires ingenious engineering and production methods . . . and it is at Allied where you will find the best examples of cold forging ingenuity at work.

If you have need for parts similar to these . . . if you require tolerances as close as may be required for most machined parts . . . if you want maximum strength and durability in the parts produced . . . it will pay you to investigate what Allied can do for you. Send your part prints for quotation.

Other Allied Products

HARDENED AND PRECISION GROUND PARTS
SHEET METAL DIES PRODUCED IN IRON, ALLITE (ZINC ALLOY) AND PLASTIC • R-B INTERCHANGEABLE PUNCHES AND DIES

STANDARD HEXAGON HEAD CAP SCREWS

Also produced by Allied are standard hexagon head cap screws. They are of uniformly high quality and are priced competitively. Your inquiry will receive prompt attention.

PRECISION · EXPERIENCE · DEPENDABILITY
ALLIED PRODUCTS

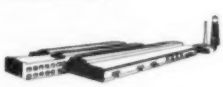
ALLIED PRODUCTS CORPORATION

DEPT. D-14 · 12605 BURT ROAD · DETROIT 23, MICHIGAN

PLANT 1
Detroit, Mich.

PLANT 2
Detroit, Mich.

PLANT 3
Hillsdale, Mich.



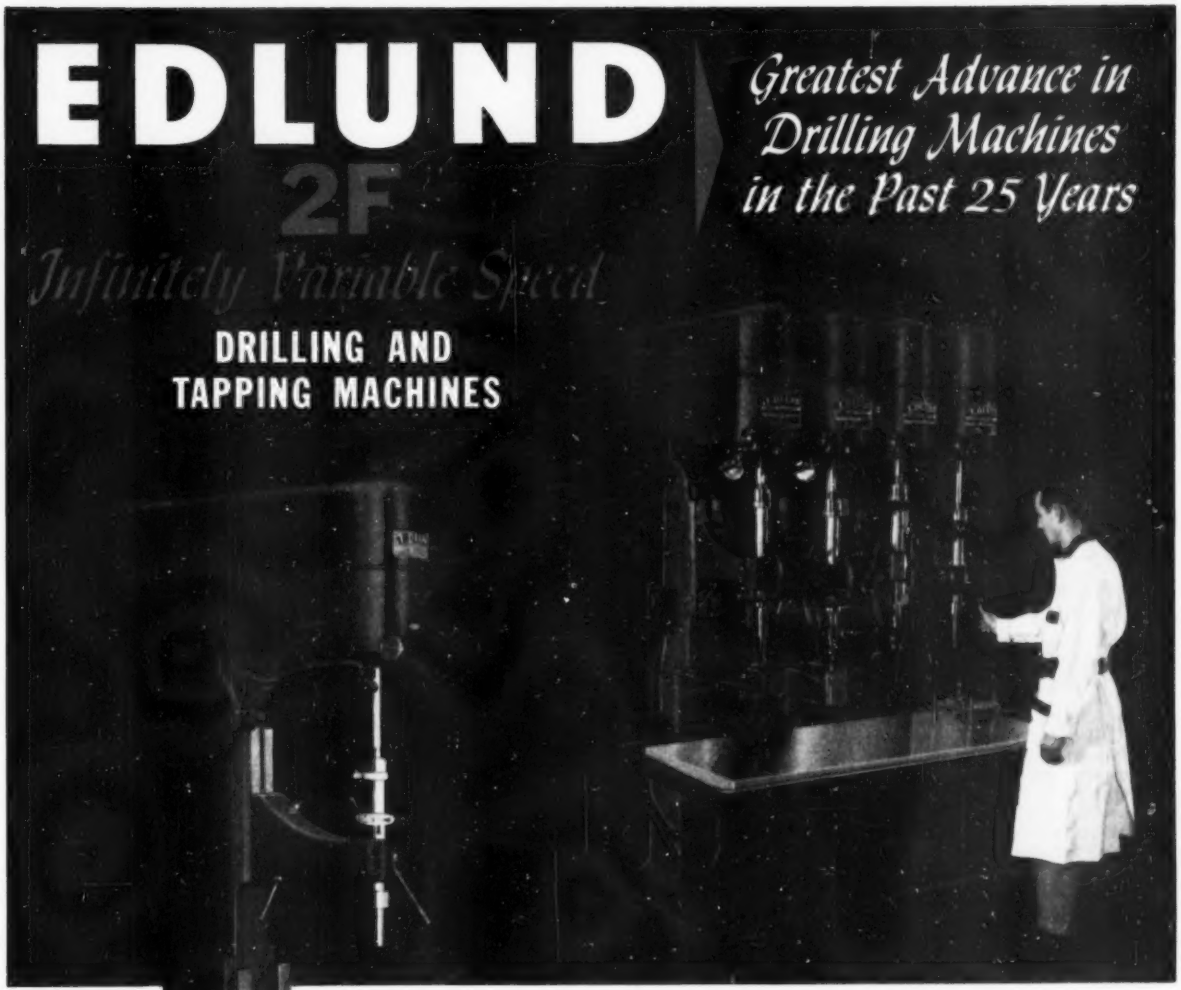
PLANT 4
Hillsdale, Mich.

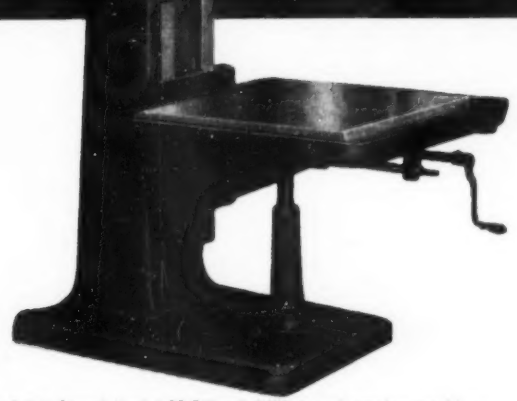
EDLUND 2F

Infinitely Variable Speed

DRILLING AND TAPPING MACHINES

Greatest Advance in Drilling Machines in the Past 25 Years





Variable Speed Model 2F Edlund drilling and tapping machines in standard models to meet your requirements
Spindles: 1, 2, 3, 4, 6, or 8
Speeds: From 50 to 3600 RPM
Overhang: 8" or 15"
Column: Pedestal or Round
Capacity: To 1¼"
Special models engineered to order.
Additional Edlund Equipment: Back Gears (ratio 4 to 1); Semi-Automatic Power Feed; Coolant System; Work Lights; Reversing Motor Tapper; Lead Screw Tapper.

INCREASED PRODUCTION
—25% or more

MAXIMUM TOOL LIFE
—Correct Speed

PRECISION PERFORMANCE
—Rigid Construction

The Edlund new Model 2F with infinitely variable speeds, gives your operator an infinite number of speeds within a broad range—not the ordinary three, four and eight speeds—this means **correct speed for maximum tool life and greatest production.**

Speed changes are made instantly without stopping and valuable production time is not lost changing belts or gears. Convenient controls for easier operation and rigid construction with ample work table area assure precision performance. Here is the advanced-design drilling and tapping machine built under actual tool room and production test conditions for your requirements.

For complete specifications, write for Bulletin 140.

Dealer Representation in Major Cities

EDLUND MACHINERY CO. [A]
DIVISION OF BRADLEY EDLUND CORP.
Cortland, N. Y., U. S. A.

[A] Affiliated with Precision Castings Co., Inc.

Eclipse-Pioneer* triples balancing output of air-pump rotors with TREBEL BALANCER

Rough balancing increased from 3.1 to 9.6 per hour
Fine balancing increased from 3.15 to 13.1 per hour

*Division of Bendix Aviation Corporation

Locate unbalance in your rotating parts this fast, simple way

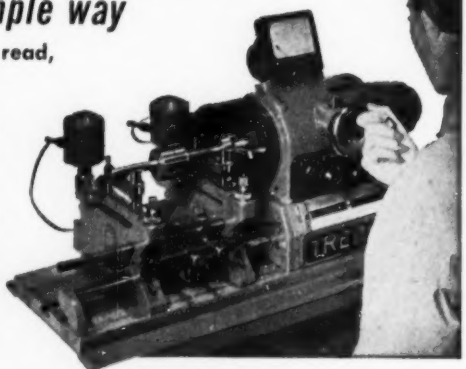
Takes less than a minute to read, 2 minutes to set up.

No special skills are needed to detect the *unbalance* that causes *vibration* in rotating parts . . . when you use the TREBEL DYNAMIC BALANCER.

The unique TREBEL dynamic balancing principle applies a variable counter-vibration to counteract unbalance vibration. Direct readings in ounce-inches give the *amount* of unbalance without further calibration; readings in degrees show *location* of unbalance.

That's why so many leading plants use the TREBEL.

Write for Catalog "A" or see a demonstration in your own plant.



Model 2 b 5 Trebel Balancer
Weight capacity 2½ oz. to 4½ lbs.
Max. work diameter 7"; length 18"
Accurate within .000025" displacement of center of gravity
Other Trebel models for work up to 22,000 lbs. and 98½" OD.

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KURT ORBAN COMPANY, INC.

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in considerable volume, you may profitably make it yourself from coiled strip on a small, compact Yoder electric-weld tube mill. Daily production from 25,000 to 50,000 feet with only one operator and a helper. Amazingly simple and trouble-free, the new 4-in-1 Yoder welding transformer insures highest output of quality tubes at lowest cost per foot or mile.

Yoder Tube Mill Book tells complete and interesting story of the Yoder method and answers most pertinent questions about first cost and operating cost, minimum requirements for profitable operation, skill and training of operators, power consumption, weldable materials, tooling, etc. Send for it.

Latest Yoder development: Highly economical new process of making *aluminum, brass* and *other non-ferrous tubing* by cold forming and welding of coiled strip. Details on request.

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YODER ENGINEERING MANUFACTURING

Electric Weld TUBE MILLS

For 30 Years— EXPERTS AT STAMPINGS IN SMALL LOTS SHORT RUNS

DAYTON ROGERS *Manufacturing Company*
Minneapolis 7, Minn.

New York City, Chicago, St. Louis, Denver, Cleveland, Baltimore, Pittsburgh, Milwaukee, San Francisco, Indianapolis, Detroit; Dayton, Ohio; Rochester, N. Y.; Grand Rapids, Mich.; Newton, Mass.

In November, you'll receive, as part of your regular subscription to *American Machinist*, the

1954 PRODUCTION PLANBOOK for Metalworking

Details on the *PLANBOOK* soon.

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SOUTH BEND 10" Precision LATHES
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SOUTH BEND MACHINE TOOLS

for Better, More Efficient Machining

Here are precision machine tools that consistently hold down machining costs while producing work of better quality. Return the coupon for catalogs of quick change gear lathes, toolroom lathes, bench lathes, turret lathes, drill presses, shapers, pedestal grinders and attachments in which you are interested.

Yes—you can get most any South Bend product immediately from our distributor's stocks in principal cities. Items not stocked, shipped promptly from factory.

Three Ways to Order

1. See or telephone nearest distributor.
2. Order by mail from your distributor.
3. If no distributor is nearby, order direct from factory.

South Bend machine tools with accessories may be purchased on convenient terms up to 12 months.

$_____ enclosed for handbooks checked

- ☐ How to Run a Lathe—50¢
- ☐ How to Run a Shaper—25¢
- ☐ How to Run a Drill Press—25¢

SEND CATALOGS CHECKED:

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- ☐ Series 900 and 1000 (½" and 1" collet) Turret Lathes
- ☐ No. 2-H (1" collet) Turret Lathes
- ☐ Complete Lathe Catalog
- ☐ Attachments and Accessories—Lathes, Drill Presses, Shapers
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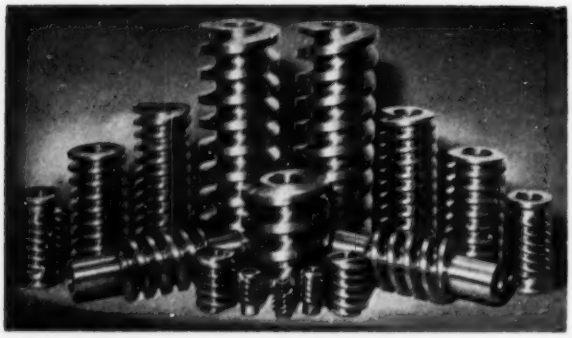

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It's craftsmanship in making gears that counts. The kind of craftsmanship that gives minute attention to every detail of manufacture. Adams gears are custom made to your most exacting specifications. Precision at Adams is more than a word, it's a fetish. When you specify Adams gears you actually get the ultimate in precision craftsmanship. It makes a big diff rence.

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FINE GEARS MADE TO YOUR SPECIFICATIONS

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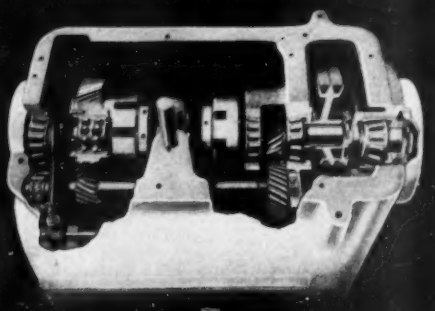
Acme's complete facilities include over one hundred major machine tools.



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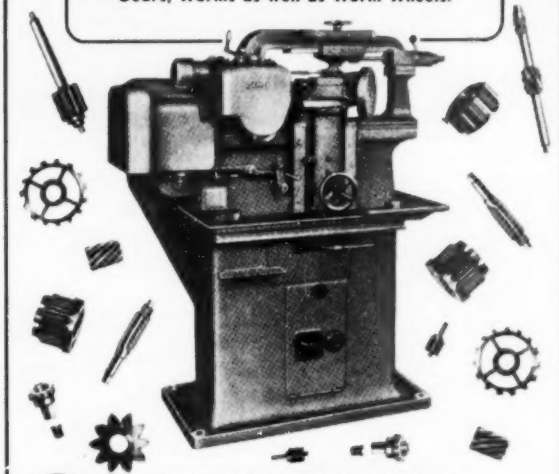

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COMPLETE LINE OF PRECISION INSTRUMENTS
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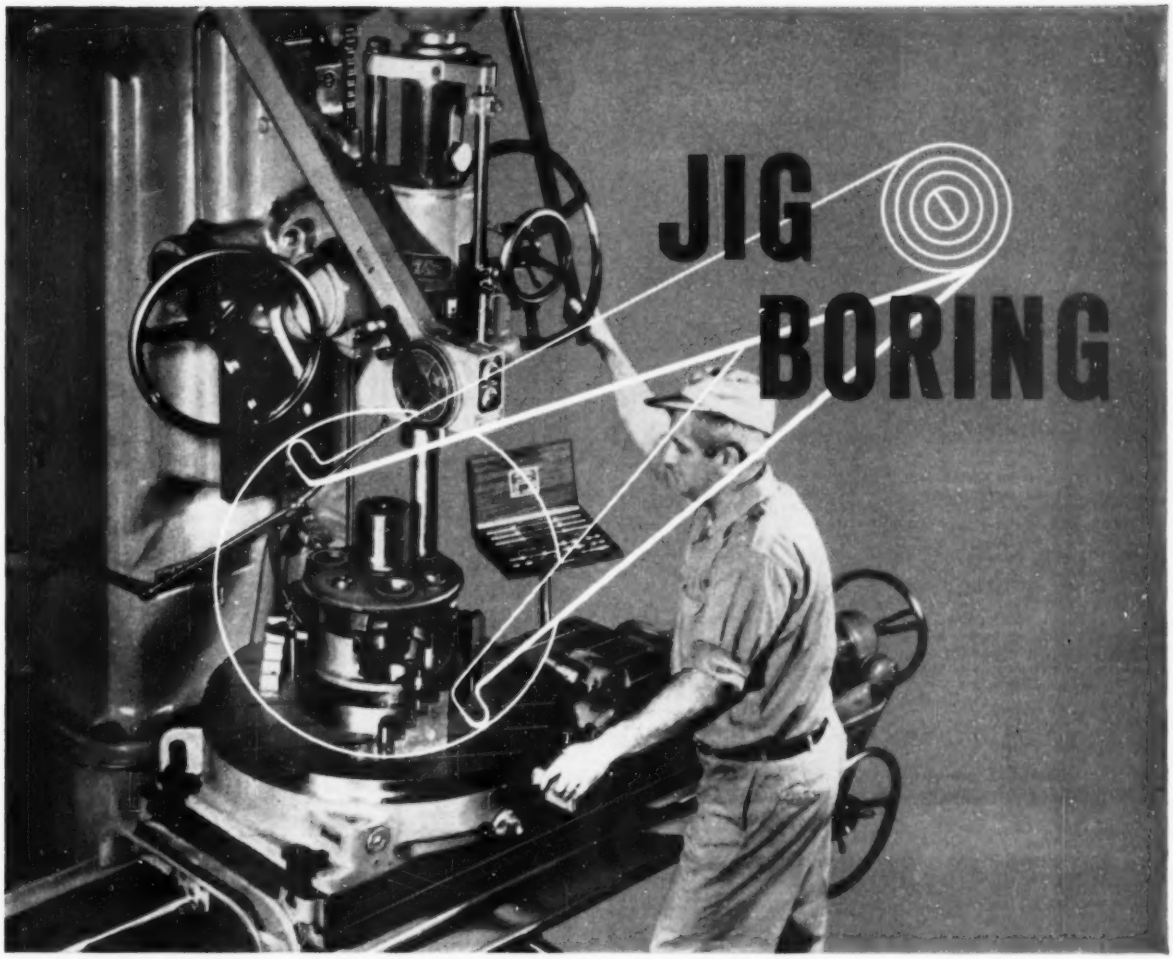

Mention jig boring to a craftsman machinist and he thinks instantly of "extreme" precision. And that's exactly what it is—an operation which finishes an ordinary machined surface to a micro-precision tolerance. The accuracy of jig boring is required on only a small percentage of gears, but BRAD FOOTE is in a position to produce this accuracy when required.

• Jig boring is another of the wide variety of manufacturing methods employed by BRAD FOOTE to make gears exactly right for you and each of our many other customers.

• Consider the advantages of using BRAD FOOTE gears, transmissions, and reducers on the equipment you operate . . . or on the machines you make and sell to others. Every operation on every BRAD FOOTE gear or assembly is done under close supervision. From the inception of the original design to the final finished product, *no one shares our responsibility.*

• Send us your specifications for prompt quotation. Or, tell us the job that the gears must do and we'll design them for you. We'd like to do business with you, and we think you'll like doing business with us.

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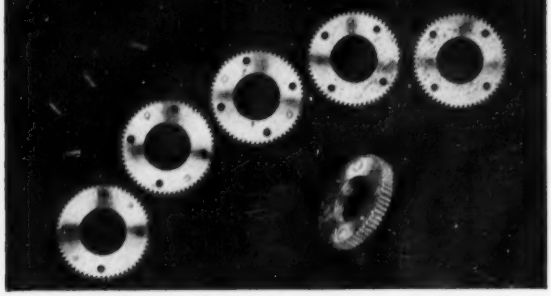
Making Better STAMPED Gears Is a Highly Developed Winzeler Specialty



Now, you can get *extreme accuracy* in the *Stamped* Gears you need. Better men and methods and machinery, developed through years of specialization, have resulted in a degree of economy and precision unequalled in the history of *Stamped Gear* making! Eliminate assembly headaches . . get smoother, quieter performance with WINZELER Stamped Gears.

WRITE FOR FREE *4-page catalog-folder describing our facilities and the various Stamped Gears, Tools and Assemblies we make. Valuable gear data and tables are included. Or, get ideas, samples and low cost estimates. No obligation.*

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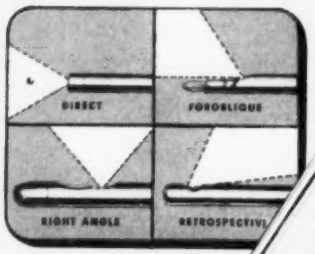
WINZELER MANUFACTURING & TOOL CO.
1712 WEST ARCADE PLACE, CHICAGO 12, ILLINOIS

A.C.M.I. BORESCOPES

for close-up visual inspection of internal surfaces and hidden parts



A. C. M. I. Borescopes are available in 4 angles of vision (as above)—in diameters of .120" to 4.00"—in lengths of 4" to 720". Special models for special problems.

A.C.M.I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling. • Each Borescope is a compact, self-illuminated industrial telescope of highest quality, employing a precision optical system, that produces a flat visual field. Lens systems are fully corrected for color, spherical aberrations, and coma, with all lens surfaces coated to increase light transmission

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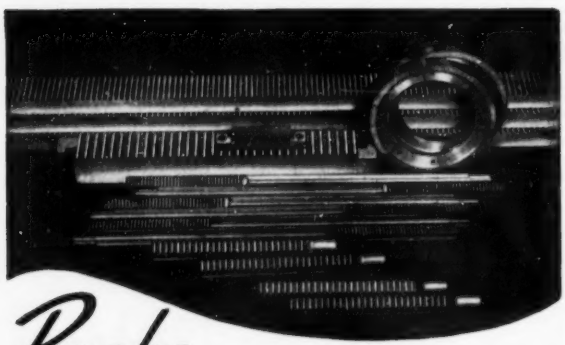

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Stahl precision is embodied in these racks, which are made in all shapes and up to 20 feet long, 3 DP. Flawless in operation, they are fabricated to your exact specifications and at prices that will please you. Stahl's skill and experience, with facilities that insure quick delivery, are at your disposal. For the finest in racks or gears it will pay you to get Stahl's estimate first.

SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 2½" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FABROIL
HEAT TREATED, CASE OR FLAME HARDENED GEARS — OF CARBON OR ALLOY STEEL

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GEAR & MACHINE COMPANY
3901 Hamilton Ave. Cleveland 14, Ohio

Talide
(TUNGSTEN CARBIDE)

THE WORLD'S HARDEST METAL

1 Many times more durable than steel, it adds years of life to the wearing edges of tools, dies, machinery and equipment.

2 Hard as a diamond and almost indestructible, it triples output per man and per machine.

3 New heavy-metal alloy (17.5 specific gravity) has proven best for atomic radiation screening and for applications requiring maximum weight in minimum space.

Write for Catalog 52-G

METAL CARBIDES CORPORATION
YOUNGSTOWN 7, OHIO

HOW HOLLOW BOOMS ARE COLD-FORMED IN ONE OPERATION

on a

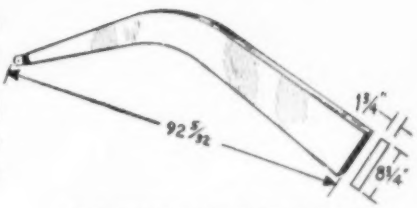
PINES *Automatic* BENDER

SEE PINES EXHIBIT
BOOTH 2608
NAT'L METAL SHOW

Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

41° Edge Bend in Heavy 12-Gauge Stock Simplifies Production Problem

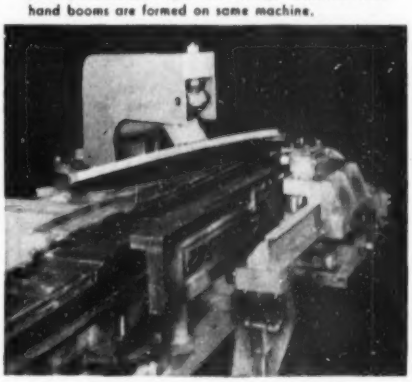
Here's another example of how cold-forming the "Pines-Way" speeds production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112") hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.



LOADER BOOM FOR FARM TRACTOR
Workpiece is fabricated from two tapered U-shaped pieces, arc-welded together. Both right-hand and left-hand booms are formed on same machine.

Smooth, Accurate Bends Produced in Tapered Section

The Bender and special tooling, engineered by Pines, produces a smooth 41° edge bend to a 34" radius. The draw bending principle employed permits holding close tolerances for easy assembly. By using a flexible floating-type mandrel, tapered to fit the inside of the workpiece, and a separate hydraulically-operated hold-down shoe that works in sequence with the clamping die, wrinkles and buckles are eliminated. One man handles the entire bending operation. The hydraulic bending and return cycle is automatic, push-button controlled.



View of floating-type flexible mandrel and tapered sliding pressure die. Automatic air-operated support holds mandrel in proper alignment on forward stroke, retracts for clamping. Same machine with different tooling also cold bends 3" heavy wall pipe for undercarriage loader supports.

WRITE FOR *Free* DATA SHEETS

To get a better idea of the cost-cutting advantages and unusual versatility of Pines Benders, write today for free copies of "Pines News" illustrating and describing actual bending and tooling techniques on a wide range of jobs.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING • DEBURRING • CHAMFERING • THREADING • CUT-OFF MACHINERY

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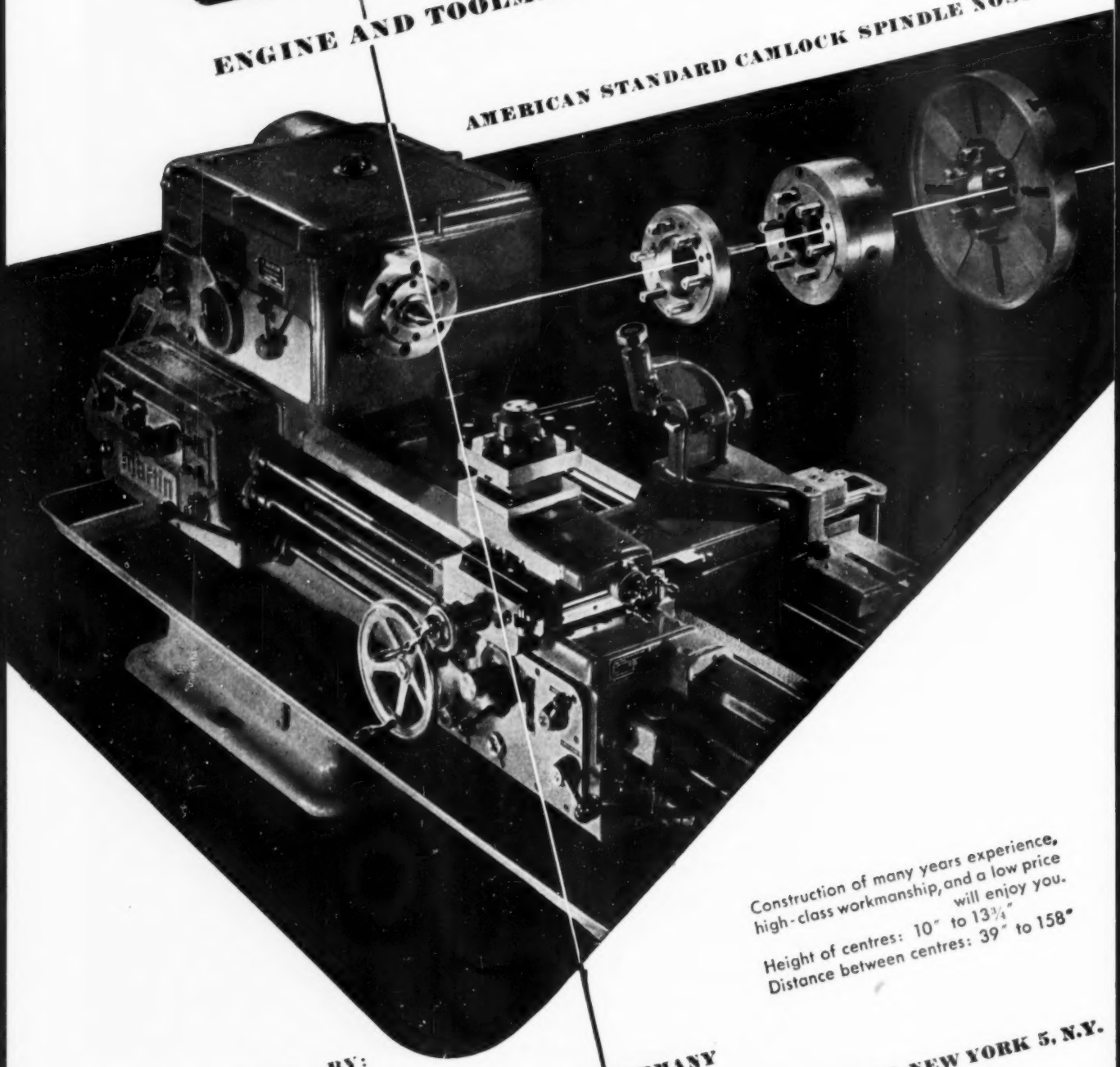

Construction of many years experience, high-class workmanship, and a low price will enjoy you.

Height of centres: 10" to 13¾"
Distance between centres: 39" to 158"

MANUFACTURED BY:

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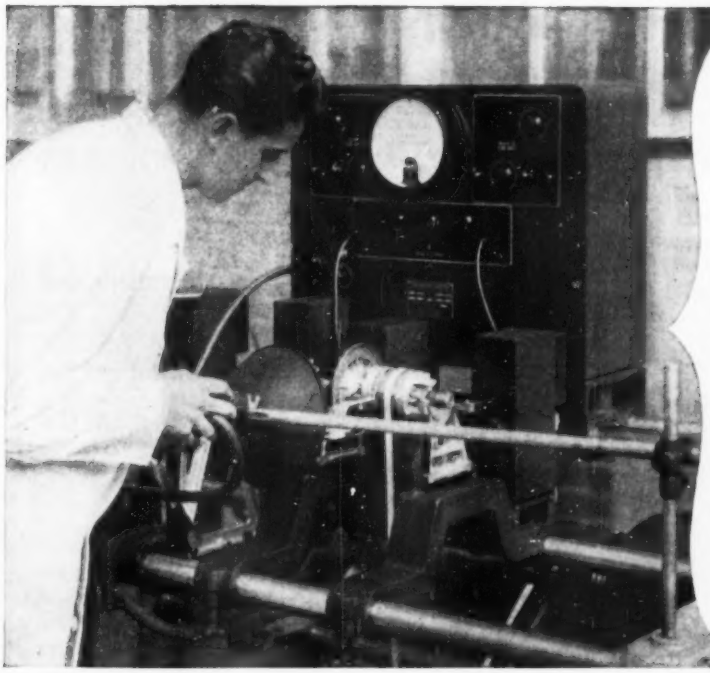


ACEC

OUTSTANDING DYNAMIC BALANCE

ACEC Motors are dynamically balanced far in excess of NEMA standards at no extra cost. Maximum amplitude of vibration of ACEC Motors measured according to NEMA-MGI-4.21 (Oct. 1949) specification.

Location of Measurement	3 HP 1800 RPM	5 HP 1800 RPM
Pulley End Bearing Housing:		
Horizontal Amplitude	0.00035	0.00025
Vertical Amplitude	0.00025	0.00025
All other parts of Motor	0.00020	0.00015 to 0.00020

NEMA (MGI-4.20) Recommended Standard

Frame Sizes	Amplitude in Inches
203-254	0.00100
284-364	0.00150
365-505	0.00200

THESE QUALITY + FEATURES SHOW WHY ACEC MOTORS DELIVER BETTER PERFORMANCE

Dynamic balancing far in excess of NEMA Standards, as shown above, practically eliminates vibration. Equal load distribution on bearings obtained in ACEC design greatly prolong life of these bearings—assures a longer lasting, smoother running motor *at no extra cost to you.*

Tightly sealed bearing enclosures keep lubricant in and dirt and foreign particles out. ACEC motors operate at any angle.

Rounded stator slots top and bottom assure tighter fitting stator windings—eliminate voids that collect dirt and moisture, shorten insulation life.

"Baked-on" insulation. Oven-dried polyvinyl-acetal insulated windings receive two additional coats of "baked-on" plastic insulating varnish for maximum dielectric strength.

Simple, rigid assembly results from cast iron frame and end shields and use of 4 through-bolts with 8 nuts. End shields can be removed without disturbing bearings on shaft.

Rigid quality control maintains quality of materials used in ACEC motors within the narrowest limits. Every motor receives thorough testing—carries a factory guarantee.

ACEC Motors offer these and many other quality features, *yet they're priced below most other motors.* Manufactured strictly to NEMA Frames and Specifications by one of the world's largest electrical manufacturers, they are available in a wide variety of types from **300 ACEC Distributors and Service Shops** across the nation.

No matter what your motor requirements, it will pay you to investigate ACEC's top-level performance *at lower prices* by writing to the addresses listed below.

Open Drip Proof ACEC MOTOR

BELGIAN ELECTRIC SALES CORPORATION

New York City: 40 E. 49th St. PLaza 8-3105

Los Angeles: 423 E. 3rd St. MAdison 6-4421

Sales Engineers & Agents in Principal Cities

CHARLEROI ACEC

ACEC Motors

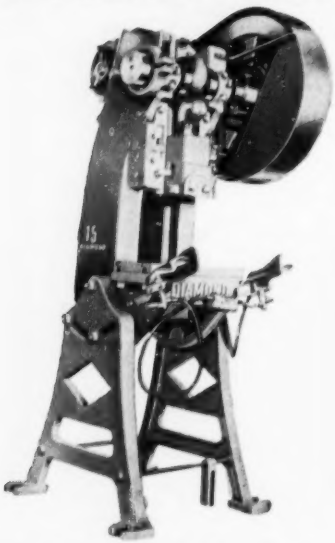
PRECISION PRESS FRAME ALIGNMENT

Thru Seasoned Castings!

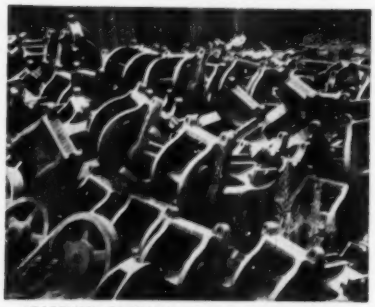
What Does This Mean to You?

CONTINUOUS Production

- ✓ NO WARPAGE OF FRAME
- ✓ PERFECT PUNCH & DIE ALIGNMENT
- ✓ LONGER DIE LIFE
- ✓ EXTRA PRESS FRAME STRENGTH



Diamond 15-ton open belt press illustrated with optional air controls. Sizes range from 9 to 60 tons. Open belt and back geared.



SEASONED CASTINGS—Above photo illustrates a partial view of Diamond press frames outdoors under exposure to all weather conditions. They are left to season by this natural process for an average period of three years. This assures castings of the highest quality.

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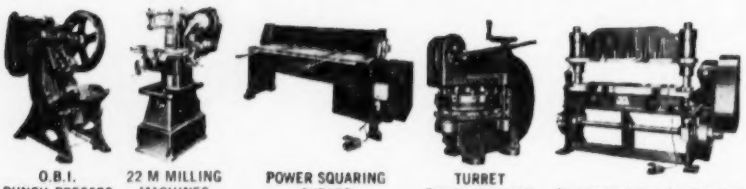

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2. Casting
3. Extrusion
4. Cold Drawing
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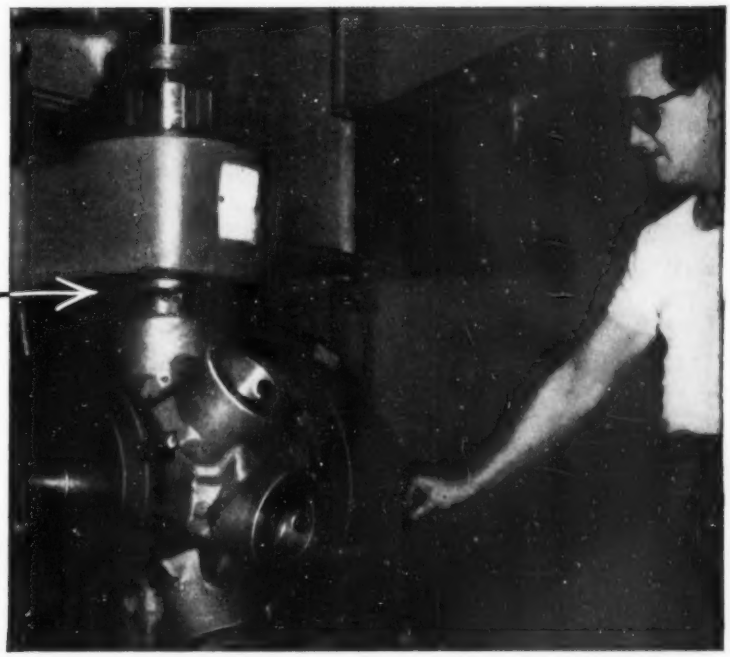
because HAYNES STELLITE *tools resist* CHIPPING and SPALLING



This boring head, containing 20 HAYNES STELLITE inserted blades, operates for 4 to 6 weeks without grinding.

Here is how the HAYNES STELLITE blades are positioned in the boring head.

A multiple blade boring head containing 20 HAYNES STELLITE alloy inserted blades operates from 4 to 6 weeks without regrinding at a plant making refrigeration and air-conditioning equipment. The tools bore, chamfer, counterbore, drill, and face the cylinder ports in cast iron compressor heads. This is all done in one operation.

HAYNES STELLITE blades average over 2000 cylinders per grind even though machining is complicated by an intermittent cut at a gas outlet port in the cylinder wall. The tools are good for 25 regrinds—an average of 50,000 cylinders per cutter.

Tools made of HAYNES STELLITE alloy resist chipping and spalling—even on tough jobs like this one. This is one reason why the tools are easy to grind and can be reground so many times.

For information on how to use HAYNES STELLITE tools on your machining jobs, write for the booklet "HAYNES STELLITE Metal-Cutting Tools." It gives helpful information on chip formation, tool design and the machinability of metals.

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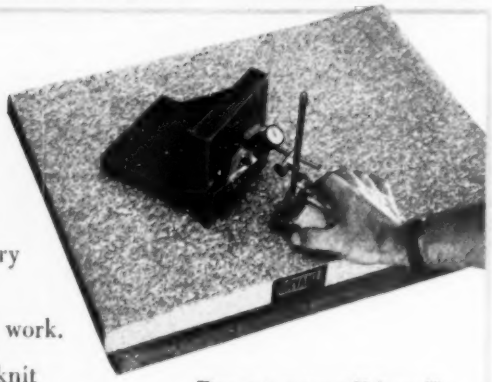

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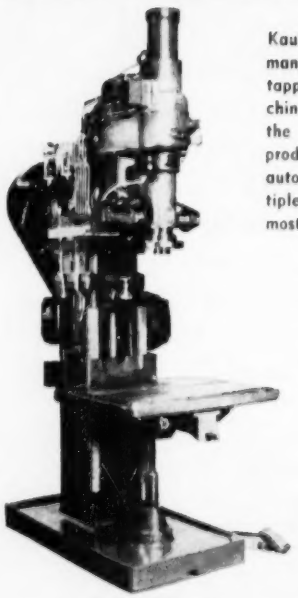

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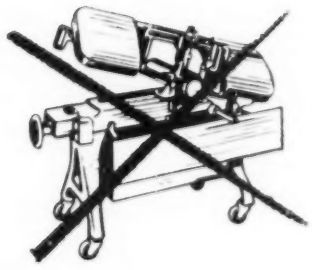

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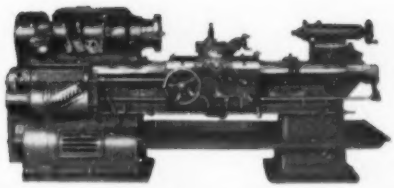

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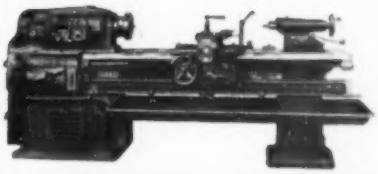

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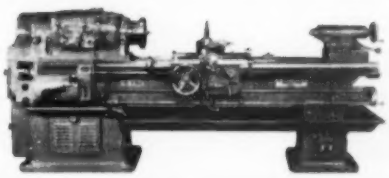

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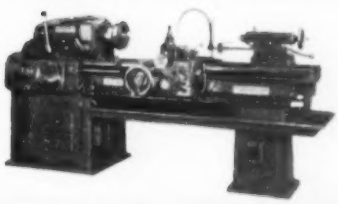

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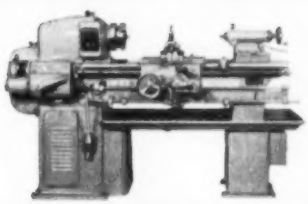

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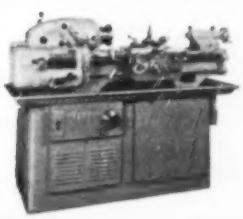

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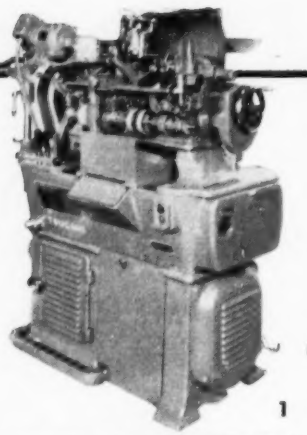

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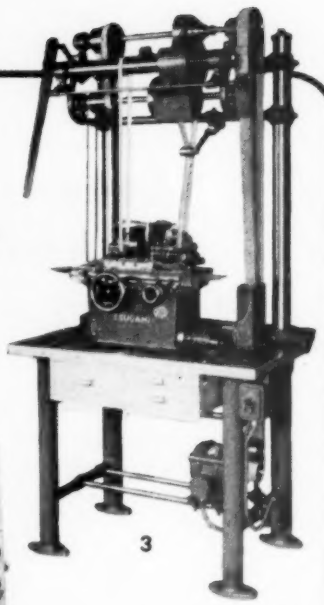

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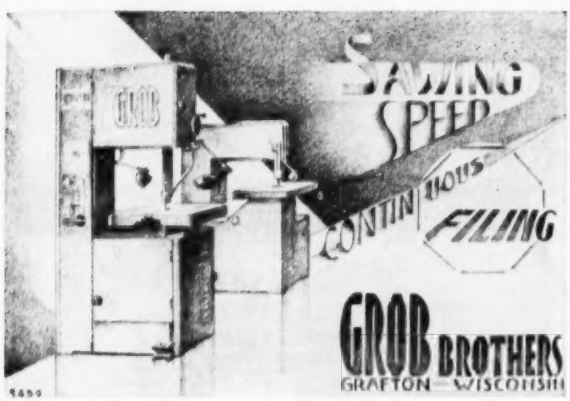

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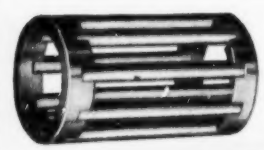

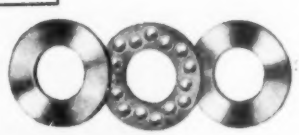

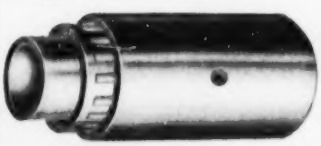

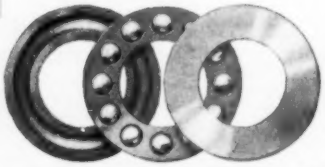

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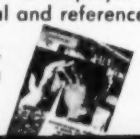

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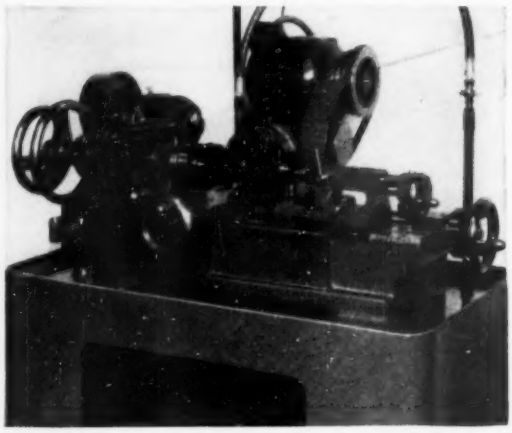

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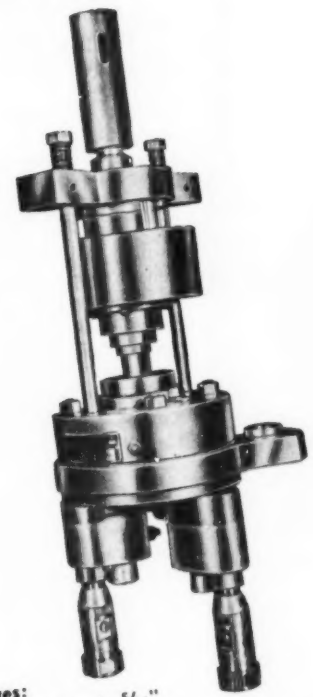
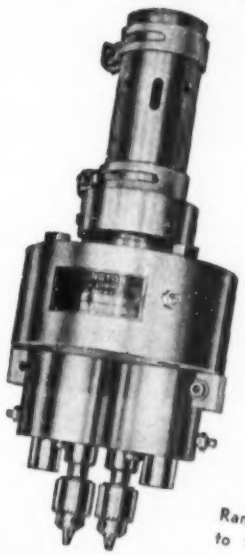


Sizes:
#0-#10 Tap to 5/16"
#1-3/16" Tap to 1/2"

ERRINGTON Adjustable DRILLING HEAD



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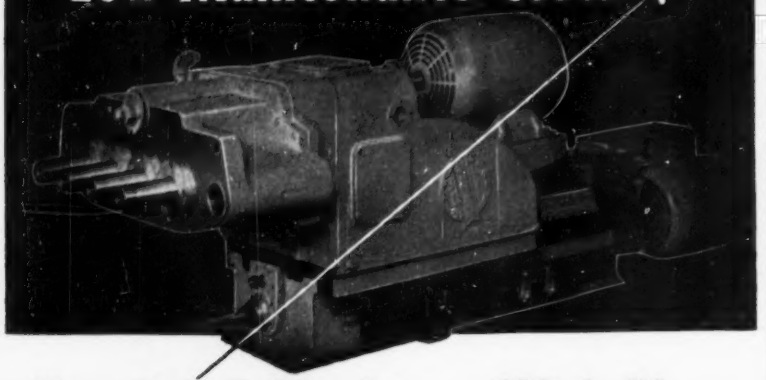
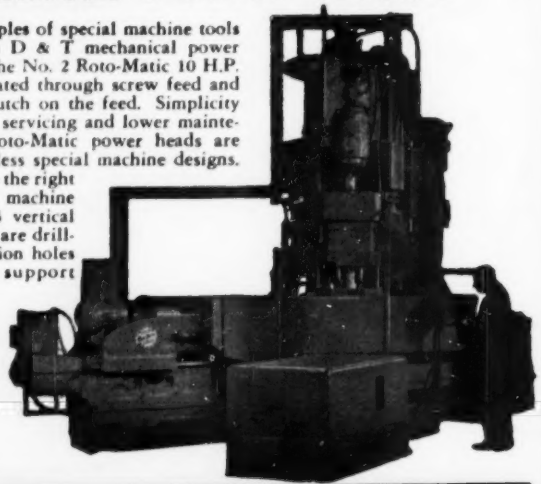


Use D&T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.



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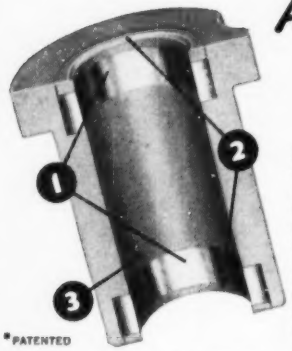

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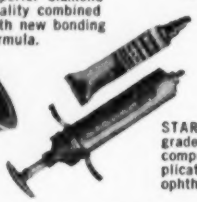

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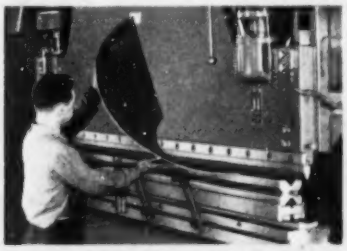

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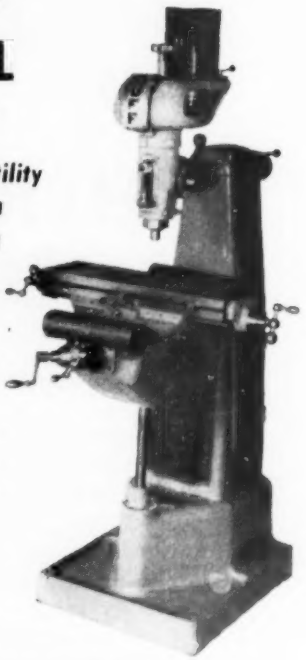

RANGE:	
Table size	8" x 24"
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Cross Feed	8"
Maximum Distance Spindle to table	15"
Quill Travel	3"
Collet Capacity	½"
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Motor	¾ H.P.
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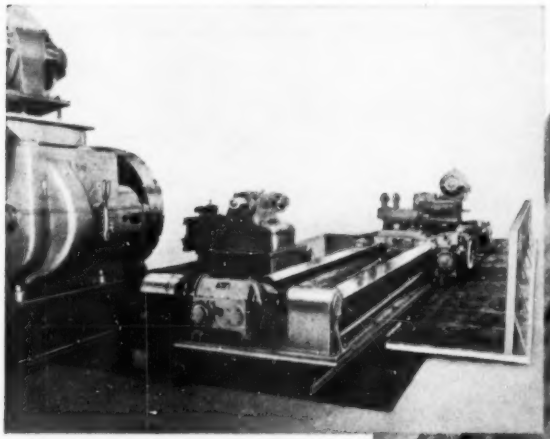
These unwieldy rolls, which run as large as 14 feet in diameter with 30-foot centers, had to be precision machined to a smooth, highly-polished finish. Any irregularities would result in poor heat transfer.

RESULT: *Lukens engineers report that this pit lathe is performing above the specifications that they originally set.*

Turning and grinding carriages on the lathe are motor-driven over the length of a 42-foot bed and can work rolls from three to fourteen feet in diameter. The tool carriage runs parallel to the pit and the surface of the slowly-turning rolls. All movement is synchronized for maximum accuracy.

If you have a production problem which might be solved by a large, special machine tool, Simmons engineers may be able to help you as they have helped so many others. Write or phone us your problem today. And ask for our quarterly publication, *The Simmons Way*. It describes many other case histories about successful machine tool design, manufacture, and rebuilding.



End-on view *of Luken's Pit Lathe shows pit needed for free clearance of large diameter rolls. Carriage travels length of pit.* **At Right:** *42-foot, 17-ton bed of the lathe; ways were finish-ground to 0.002 in.*

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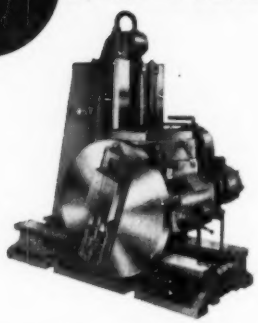

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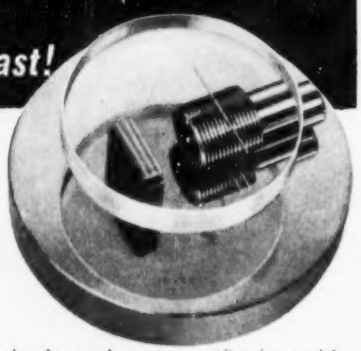

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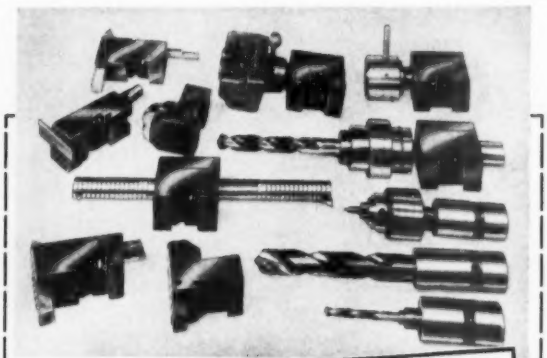

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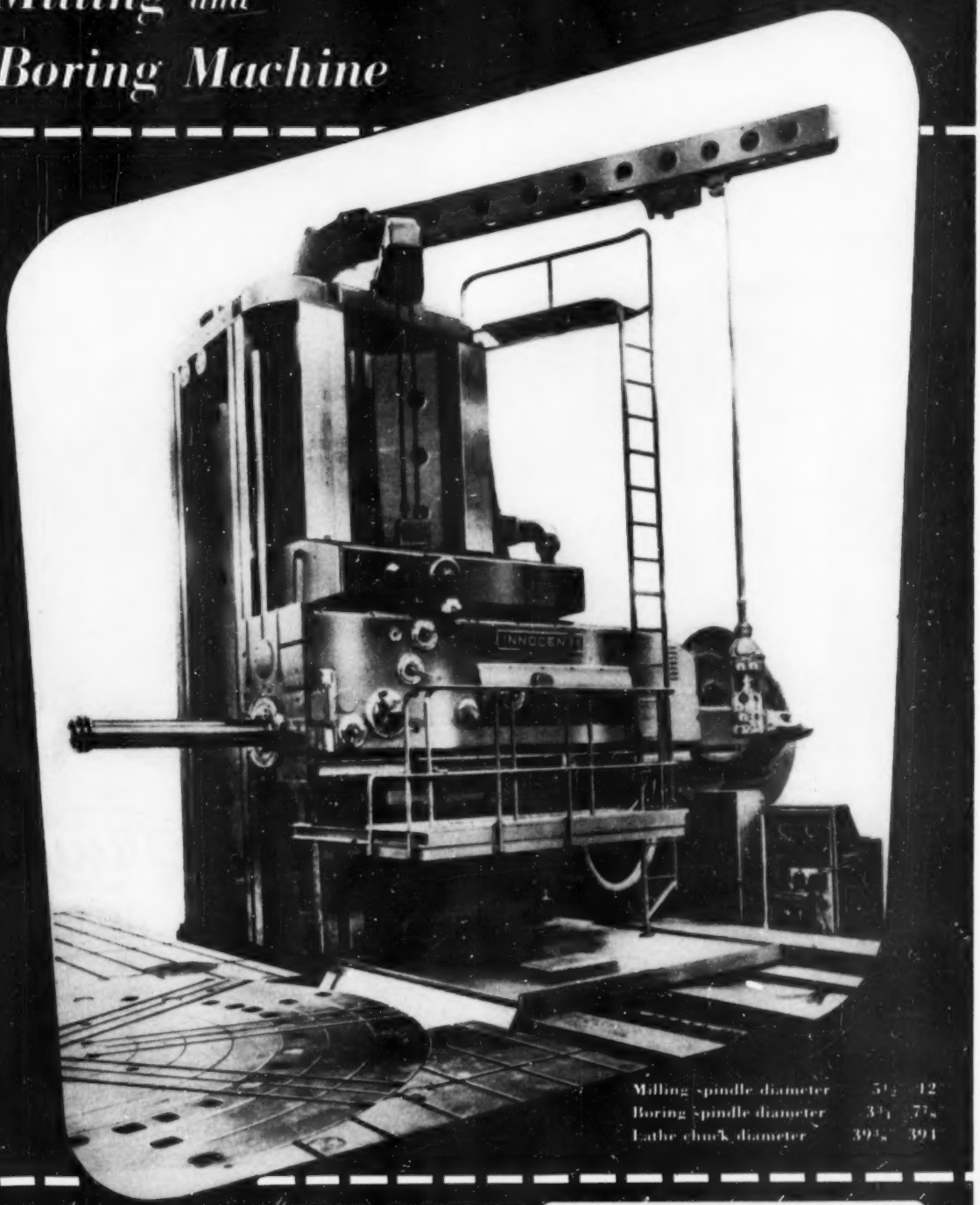

Milling spindle diameter	5½	12
Boring spindle diameter	3½	7⅞
Lathe chuck diameter	39⅜	394

Presented at the 3rd European Machine Tool Exposition in Bruxelles

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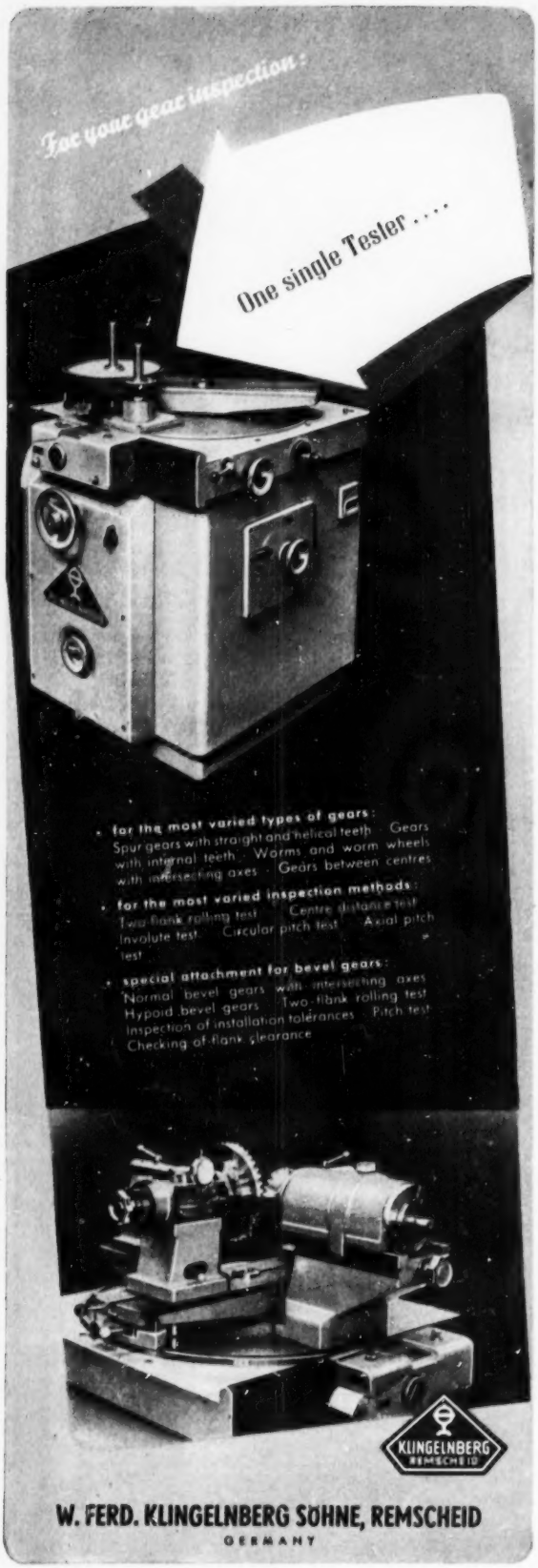
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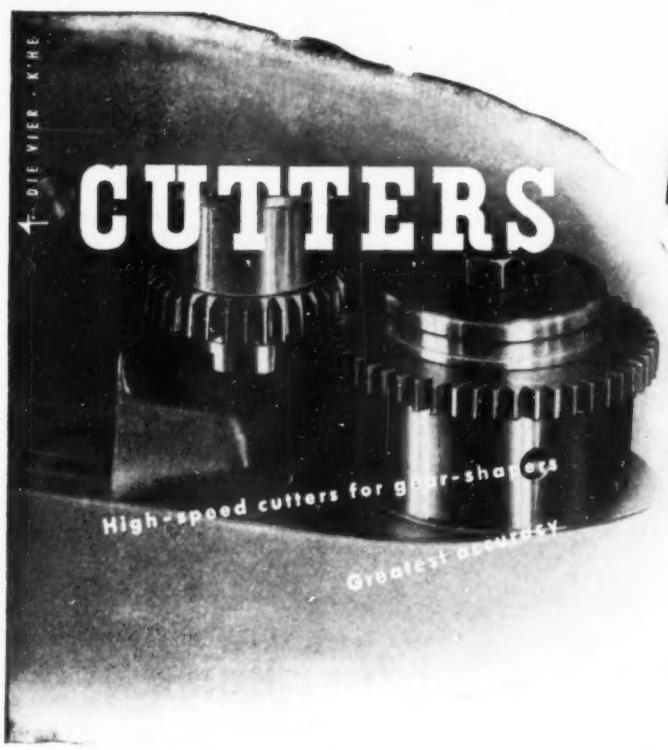

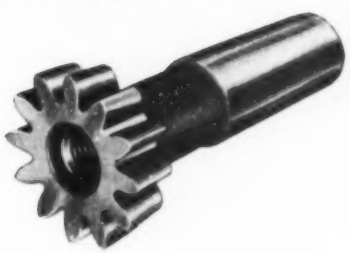

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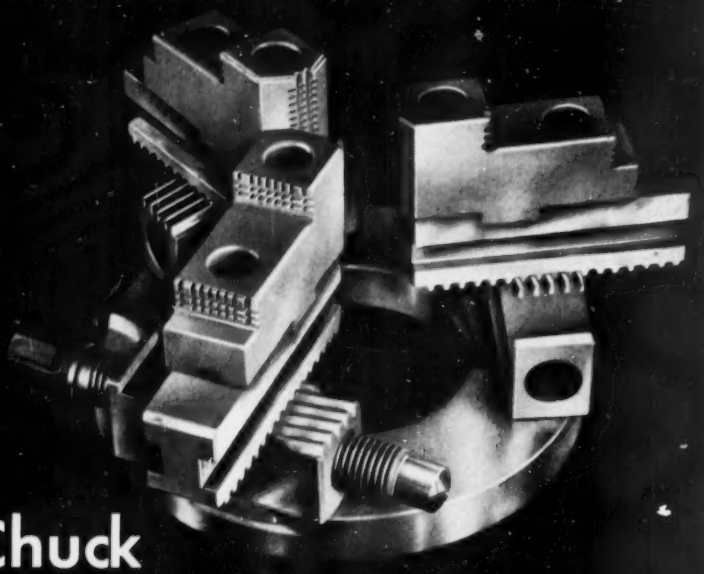

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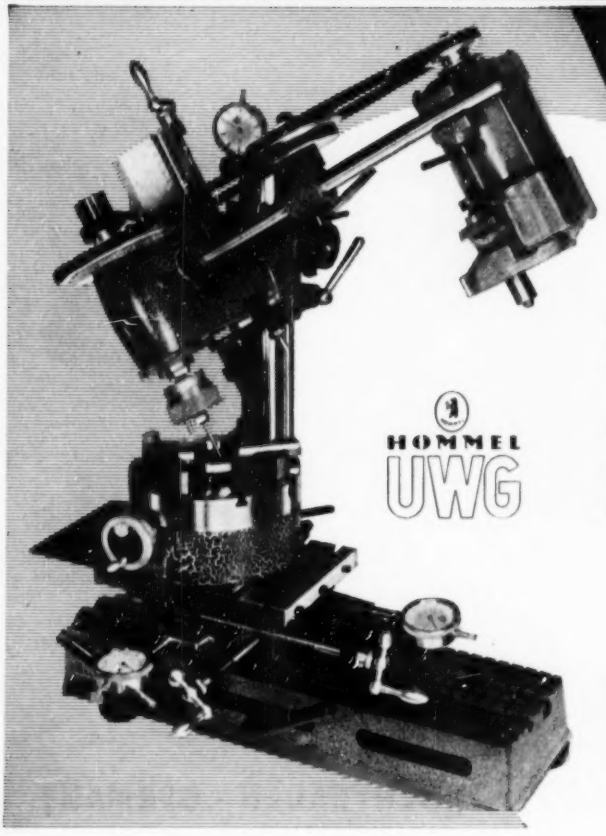

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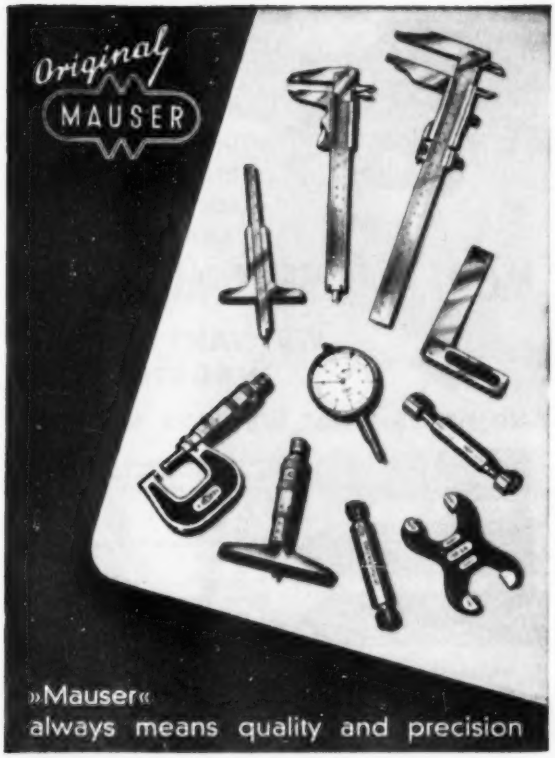

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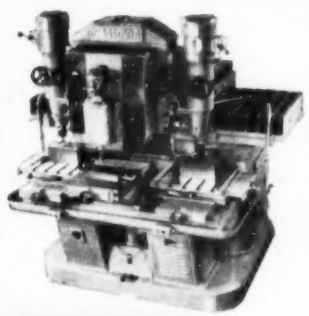

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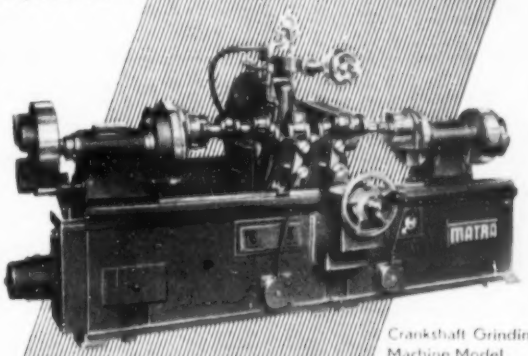
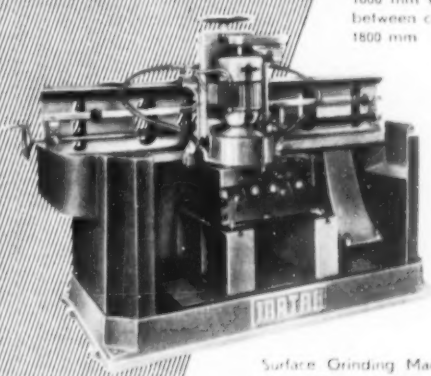


Crankshaft Grinding Machine Model KA 26 height of centres 265 mm distance between chucks 1600 mm distance between centres 1800 mm



Surface Grinding Machine Model ZA 1 grinding width 510 mm grinding length 1200 mm

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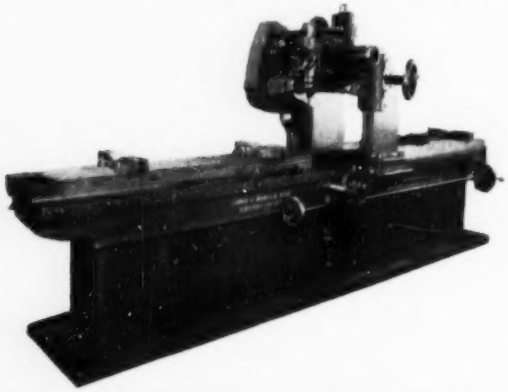

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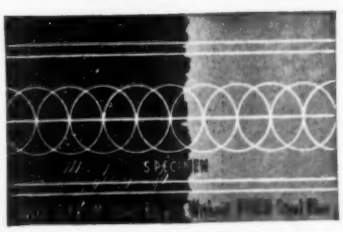

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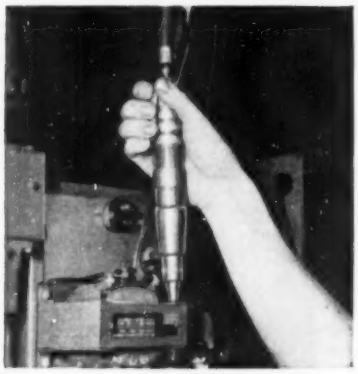

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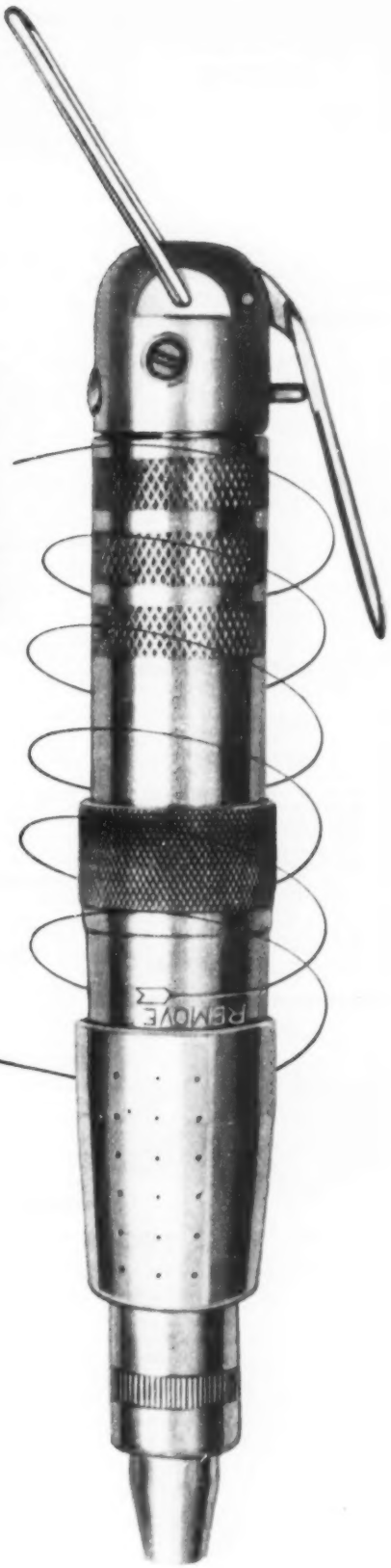

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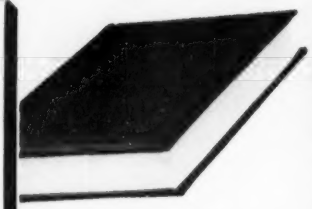

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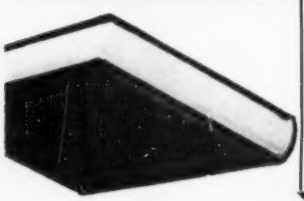

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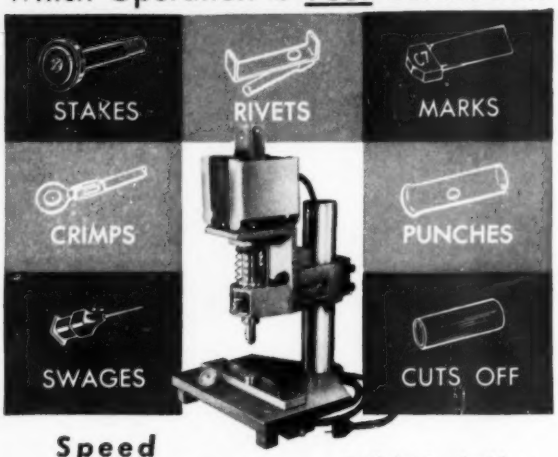

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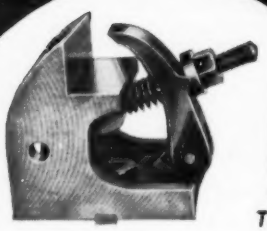

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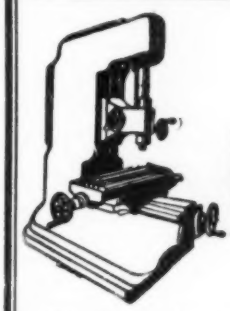

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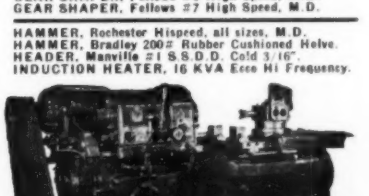
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x4¼".
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterholm Disc. 24" cap.
GRINDER, 30" Ingersoll Tub Face Mill, M.D.
GRINDER, #79, 72" Gardner Vert. Spindle. Late.
GEAR LAPPER, #8LS, #13L91 Fellows, Outboard Supports, Detachable Laphead, Late.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 3/16".
INDUCTION HEATER, 16 KVA Ecco Hi Frequency.

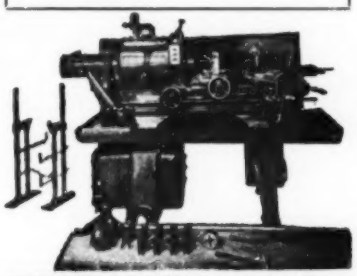


4DE POTTER & JOHNSTON Automatic Turret Lathe, Motor Driven, T.E.F.C. 7½ HP. 3/60.220/440.

INDUCTION HEATER, 30 KW Lepel, Late Type.
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

No. 7 BARDONS & OLIVER Geared Head
Full Universal Turret Lathe, Preselector Head. Bar Feed. 4" capacity through spindle. Late Type, Motor Driven.

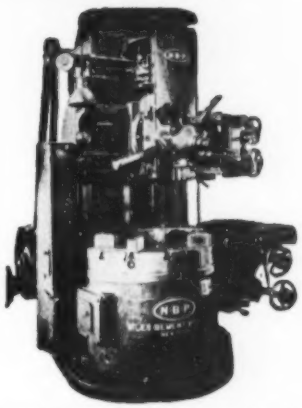


#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speeds, Bar Feed.

LATHE, Lo-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9'x15" Geared Head Prod.
LATHE, #6 WSL Reid Smallpiece Prod., Late Type.
LATHE, LeBlond 14"x6', Q.C.G., M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach, M.D.
LATHE, American 16"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x10' Axelson Grd., Late, M.D.
LATHE, 24"x12' Boye & Emmes Grd. Hd., T.A., Late
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Ledge & Shipley 26"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timesaver, Grd. Hd. M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Buffing Dble. End #VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #2 Cinci. Acme Univ. Geared Head.
LATHE, Turret #3A Warner & Swasey Univ. M.D.
LATHE, #60I Oster Hand Turret, M.D., Late Type.
LIFT TRUCKS, 1 & 2 ton, Platform & Fork.

MILL, #1-14 Kent-Gwens Hyd. Late Type.
MILL, No. 1 U. S. Hand Mill, M.D. Late.
MILL No. 1½ Milwaukee Plain Horiz.
MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #0-8 Cinc. Vert. Prod. Rotary Table.
MILL, 2M Cincinnati Univ. Horiz. M.D.
MILL, #3B Brown & Sharpe Vertical, M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4P Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U.S. Tool #MM-1-6 Auto. Prod.
MILL, No. 0 Brown & Sharpe Plain Horiz.
MILL, #0 Douglas Palin Horiz. M.D., Coolant.
MILL, #0 Sundstrand Rigidmil Hyd., Late Type.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL #0-8 Cinc. Horiz. Rise & Fall, Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #1 Cinci. Vertical HI Power, M.D.
MILL, #5C Becker Vert. Die Sinker, M.D.
MILL, 42"x36"x12' Ingersoll Planer Type, 4 hds.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 150 K.W.
NIBBLER, #136 Savage 36"x3/16" Cap., M.D.
NAILING MACHINE, No. 16—48"-54" Morgan, Late.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.



36" x 44" Niels Vertical Boring Mill, Side Head, Motor Driven.

#40A Lees-Bradner Automatic Chucking Thread Mill. Motor Driven, Late Type.

PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, D72 & DG73 Ferracute, Redraw, M.D.
PRESS, #2½ & #6 Toledo, OBI, Motor Driven.
PRESS, #5 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 75 & 90 tons, New.
PRESS, #24 Walsh OBI 24 tons cap., Late.
PRESS, 70H & 125PA Drake Hyd. Arbor, New.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Bliss #18, #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 6S C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #6S Whitney Deep Thr. 24", foot.
PRESS, P2, P3 Ferracute M.D. Roll feed.
WHEEL PRESS, 600 ton Niles-Bement-Pond, A.C.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #46 Buffalo Forge Vert. Cap. 1"x1½" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hecker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End, 24" Thr. ¼" thru 1".

RIVET SETTER, ⅜" cap. Penn. Tubular Rivet.
ROLLS, Bertsch Pyramid 18'x1¾" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, 72"x¼" Lown Initial M.D., New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Radiac "J" DeSanno.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #8 Marvel Bandsaw, 18"x18" cap.
SAW, #4B Marvel Hack Saw 6" x 6" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x6" cap., M.D.
SAW, 10"x10" Racine Hyd., Late Type, M.D. #30C.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SAW V-26 DoALL Bandsaw, Late.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cinci., B.G., Motor Driven, M.D.
SHAPER, Morton, 36" Draw-Cut, 4 speed M.D.
SHEAR, 6' x 14 ga. Parker M.D., Late Type.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60° Throat, 10 ga.
SCREW SLOTTER, #2 Waterbury Farrel Auto.
SLOTTER, 12" New Haven Vertical M.D.
SPOTTER & SCRAPER, Anderson Power Unit, Late.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 Cam Haskins, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
THREAD ROLLER, #20, #30 Waterbury Farrel.
TRUCK, 2000 lbs. Hyster Fork Lift 9' Model GT-20.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER, Type 03DR, Steel City.
WELDER, 500 amp. Westinghouse Flexers A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WIRE STITCHER, Morrison & Acme, M.D.

OVER 2000 MACHINE TOOLS AVAILABLE IN STOCK

RELIABILITY has been earned by
WIGGLESWORTH MACHINE TOOLS

AUTOMATICS
2⅝" Cone 4 spdle., well equipped, 1936
#24 New Britain 4 spdle. chucker, 2½" cap
¼" Model F Gridley, 4 spdle.

2" 4 SPINDLE CONEMATIC, THREADING SPDLE., TAPPING ATTACHMENT, BAR FEED, CONSIDERABLE TOOLING. EXCELLENT CONDITION. 1943

BORING MILL
36" Bullard New Era, rail & side head
42" Bullard New Era, rail & side head

GRINDERS
10x36" Norton type C, mech. infeed, late
6x18" Reid, #2-I, power feed, 1939
#444 Van Norman rotary surface, 22" dia
#76RA Rogers knife grinder, 76", late
Cinn. Internal, 24" swing, 78" stroke
14" Hammond WD carbide tool, late
#104 Rivett Universal, 1942, rebuilt
#4 Bryant internal, auto. sizing
14x36" Norton C semi-auto., cyl.
73 Heald Internal Centerless
73 Heald Internal, 1944, like new
P & W deep hole drill grinder, late
Model 1311 P & W contour, late

DRILLS
4'11" Canedy-Otto radial, 1¾" cap., late
Type 14 Natco, 12 spdle., #4 M.T., inline head
#12 P & W, 9 spdle., #2 M.T., power feed
D-4 Colburn, #5 M.T., 3½" cap., 24" swing
Baker Hvy Dty, #5 M.T., p.f.
#2LMS Leland-Gifford, 26", hydraulic
#2 Allen, 2, 4, 6 spdle., #2 M.T.

GEAR MACHINERY
13LS Fellows lapper, late
7A Fellows, shaper high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES
Connel Dengler spinning, 20" swing, 15 HP
14x36" Carroll-Jamieson, g.h., chucks, 1942
42"x26' ctrs American, High Duty, 16 speeds
30"x10' American geared head, taper att.
48"x35' LeBlond Hvy Dty, taper, late
Gisholt Simplimatic, platen type, late

TURRET LATHES
#3 J & L Univ. bar feed, 2" hole, late
#5 B & O Univ., chuck, pre-selector, late
#1A W & S Univ., 3" hole. #417,756
#1L Gisholt Universal, 3" hole, 1937
Libby type H, 24" swing, 8 spdle, speeds
#2 Simmons Microspeed, air chuck, late
#3 Gisholt Universal, late
#4 W & S, bar feed, serial #342461
#4A W&S Univ., cross sliding turret, 1944

SHAPERS & PLANERS
30"x30"x17' Cleve. Openside
48x48x14' Detrick & Harvey dble. hsg.
48x48x16' Liberty openside, p.f.
26" Smith & Mills shaper, 4 step cone

MILLS
08 Cinn. horiz., rise & fall, 1943
08 Cinn. horiz., auto. cycle, 1943
#1½B K & T horiz., dble. overarm, rebuilt
10C Van Norman Contour
#3 Cinn. high speed dial type, vertical
#5B B & S horiz., round overarm, 16 speeds

THREADERS
#22 Murchey bolt & pipe, ½ to 2", late
8x16" Hanson-Whitney Universal, mill, late
6x80" P & W miller, splining & milling
#50 Excello Precision grinder, 28x68"
13" Automatic Machinery miller, late
LT636 Lees Bradner mill, 18 x 36", late
1½" Landis, 2 spdle., lead screw type
#31 Excello, diamond dresser, late

PRESSES
#37 Excelsior dble. crank, 45 ton
250 ton Elmes hyd. shell nosing, 21½" str
Ferracute type EG-52 embossing, 150 ton
#4 Toledo OBI, 25 ton. 2" stroke

MISCELLANEOUS
MAGNAFLUX: MA-3 production type, 3000 amp
WELDER: 75KVA Thompson Gibbs spot, 18" throat
WELDER: 250 KVA Federal spot, air, late
TUBE BENDER: R-48 W & W hyd., 1¼", late
TAPPERS: Haskins 2CAM, 5/16" late
Cleve. Model EO, ½", late
WELDERS: Hobart and P & H Arc, 400 amp.
BULLDOZERS: #2 Ajax High Speed, 30 ton
SAW: 34" Espen-Lucas, 1945

T. R. WIGGLESWORTH MACHINERY COMPANY
1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
2" Model A Cleveland. 1941.
1-1/16" Model A Cleveland. 1943.
No. 00G Brown & Sharpe. 1941.
No. 0G Brown & Sharpe 1941

BROACHES
HP-100 La Pointe Horiz. Broach. 1948

DRILLS
J-125-U Kaukauna Univ. Radial. 1947.

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher. 1943.
No. 6 Gleason Revacycle Generator. 1940.
No. 72 Fellows H.S. Gear Shaper. 1942.
No. 6I Fellows Gear Shaper. 1942.
10" Pratt & Whitney Hyd. Gear Grinder. '42
SG-11 Georgrind Spline Grinder. 1942.

GRINDERS
10"x18" Norton Plain Type "C". 1940.
6"x30" No. 12 B & S Hydraulic. 1940.
No. 72A-3 Heald Int. Extended Base. 1942
No. 72-A3 Heald Plain Hydraulic. 1942.
No. 24-36 Bryant Hydraulic. 1943.
No. 16A2B Bryant Hole & Face. 1942.
No. 172 Heald Hydraulic. Gap. 1940.
A3—16" Arter Rotary 1943
No. 24D Hanchett Duplex Rotary. 1945.
No. 16A Blanchard Auto. Surface. 1942.
No. 2 Cincinnati Centerless Grinder. New 1944.
Cincinnati Centerless Lapper. 1942.
HR8 Barber-Colman. 1942.
No. 35 Excello Precision Thread. 1942.
No. 7 Grand Rapids Universal. 1942.
No. 1 Brown & Sharpe Univ. 1946.

GUN BARREL MACHINES
No. ½ B x 50 P & W Reamer. Latest.
No. ½ B x 30 P & W Reamer. Latest.
No. ½ B x 50 P & W Rifler. Latest.

LATHES, ENGINE
27"x192" Niles Timesaver. 2 Carr. 1941.
27"x96" Niles Timesaver. 1940.
28"x180" Betts Bridgeford. 1940.
26"x96" Betts Bridgeford. 1940.

LATHES, PRODUCTION
8"x84" La-Swing Semi-automatic. 1941
No. 3A Lodge & Shipley Duematic. 1942
No. 1FU Foster Fastermatic. 1942

LATHES, TURRET
36" Bullard VTL, Spiral Drive. Late.
No. 1L Gisholt Saddle Type. Late.
No. 2A Warner & Swasey Saddle Type. 1940.
No. 3R Gisholt Universal Saddle Type. 1943.
No. H5 Libby Universal Saddle Type. 1939.
No. 5 Gisholt Universal Ram Type. 1942.
No. 4 Gisholt Universal Ram Type. 1940.
No. 2M-50 Warner & Swasey Ram Type. 1941

MILLS, BORING
No. 41 Lucas Horiz. 1941.

MILLS, PRODUCTION
No. 1-18 Cincinnati, 1942.
M-18 Milwaukee. 1943.
No. 3 Cincinnati Univ. Dial Type.
No 0R CINCINNATI Rise and Fall. 1943
8x16 Hansen-Whitney Thread. 1939.

MILLS, TOOL ROOM
No. 3 Van Norman Plain. 1942.
No. 22L Van Norman Plain. 1943.
No. 2 Saimp Vertical New.
No. 2 Saimp Universal. New.
No. 3 Saimp Plain & Vertical. New
No. 4 Saimp Vertical. New.

PRESSES
Versen 650 Ton Double Action. 1940.
No. 168½ Toledo Toggle.
No. 166 Toledo Toggle.
No. 67 Bliss Consolidated Press

SHAPERS
24" Gemco Univ. 1945.
Ohio Heavy Duty Univ. 1951.
16", 20", 24" Gernetti Universal Shaper. New.

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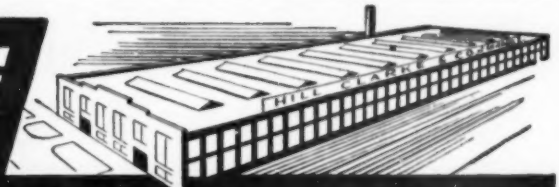

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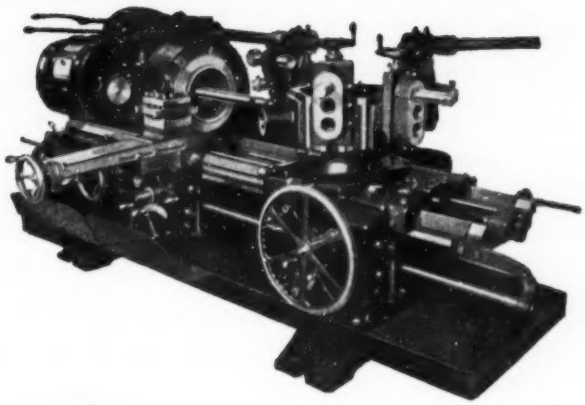

ABOVE:
4-A WARNER & SWASEY UNIVERSAL TURRET LATHE
7½" Hole Through Spindle
Price: $6750

AUTOMATIC

1-1/16" Model A Cleveland (1942)

DRILLS

1 Spdl.—14" Sw.—No. 2 Avey Cam Fd.
1 Spdl.—30" Sw.—No. 4 taper Aurora
2 Spdl.—24" Sw—No. 3 Avey
12 Spdl. D-31 Fox, No. 2 Taper

GEAR MACHINES

No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 36-BM G & E 3 Spdl, Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 64 Fellows Gear Shaper
No. 65 Fellows
8" cap Red Ring Gear Lapper

GRINDERS

6" x 18" Landis (1942)
6" x 18" Norton Cylindrical (1943)
10" x 36" Norton Type C
10" x 36" Norton Type C Cam. Grdr.
10" x 48" Norton type C (1943)
Hill-Clarke Cylindrical Grinders
10" x 36" centers
10" x 72" centers
18" x 96" centers
24 x 32 Gap x 144" centers
14" x 36" centers
14" x 72" centers
14" x 96" centers
18" x 96" centers
24" x 264" centers
No. A-3—12" Arter Rotary Surf.
No. 1109 Bryant Internal Grd. (1951) (9" swing — 1" bore x 3½" grind stroke)
No. 5 Bryant Internal Grd.
No. 5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16-A-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 16 A-28 Bryant Internal Grd.
No. 16 F-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 24-36 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

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BORING MACHINES

No. 45—4½" bar G & L Hor. Bor.
190" Niles-B-Pond Vert. Bor., Mill

LATHES

16" x 33" R-14 Seneca Falls Auto. Lathe
18" x 6' American Geared Head Lathe
18" x 8' Lodge and Shipley
19" x 8' LeBlond Hvy. Duty Lathe
27" x 12' American Geared Hd. Lathe
27" x 12' centers LeBlond Lathe
36" x 18' Putnam Grd. Hd. M.D.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt Cross-Slide Tur.
No. 4A Warner & Swasey—7½" Hole Spdl.
No. 4A Warner & Swasey, Taper, Cross-Slide (1944)
No. 4A Warner & Swasey, Taper, Cross-Slide (1942)

MILLING MACHINES

No. 08 Cincinnati Vert. Mill (1942)
54" x 30" x 16' Ingersoll Slab Mill
6" x 168" Pratt & Whitney Thrd. Mill
10" x 48" Hanson-Whitney (1942)
10" x 60" Pratt & Whitney Thrd. Mill
12" x 102" Lees-Bradner Thrd. Mill

PLANERS

36" x 36" x 12' Cincinnati, 2 hds.
48" x 36" x 14' Gray, 2 hds.
48" x 48" x 12' Cincinnati, 2 hds.
60" x 48" x 27' American, 4 hds.

MISCELLANEOUS

1"-2" Cap. Micro. Model 200 Hor. Hone
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12" x 96" Magnetic Chucks
20' x 1" cap Southwark Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)

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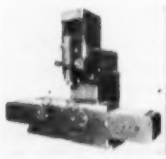
OF SELECTED MACHINE TOOLS

...for Immediate Delivery



Since 1920 we have Served Allis-Chalmers—A. O. Smith—Harnischfeger—Kearney & Trecker—Nash-Kelvinator—Harley Davidson and many others. We are well known throughout Wisconsin and the mid-west and—for all your machine tool needs we are as near as your 'phone.

BORING MILLS

BULLARD 42" Vertical Boring Mill; ser. #14,777; side head; M.D.
BULLARD Type "A" 8" Mult-Au-Matic; 6-spdl; serial #10884; M.D.

DRILLS

LELAND-GIFFORD No. 2LM8 2-Spindle; hyd. picker type feed; M.D. (Late)
BARNES 24" All-Geared; Self-Oiling; M.D.; Single Spdl.
DELTA 4-Spindle 17" Drill; power feeds; M.D.

GRINDERS

TAFT-PIERCE No. 1 Precision Surface Grinder; 6 x 12"; tilting head; M.D. (Late)
ARTER Model A-12 Rotary Surface Grinder; 14" chuck; M.D.
BLANCHARD No. 16 Surface Grinder; 26" chuck; M.D.
HAMMOND 14" Carbide Grinder; M.D. (Late).
BROWN & SHARPE No. 5 Plain Cyl. 3 x 18 Grinder; M.D. (Late).

LATHES (Turret)

JONES & LAMSON #4 Univ. Geared Head; bar feed, collets; chuck; lots of tooling; (LIKE NEW).
GISHOLT No. 4 Univ. Geared Head; preselector; M.D. (1942 mfg.).
SIMMONS No. 2 Micro Speed; geared; M.D. (Like New).
FOSTER No. 3B Saddle type; 5" spindle; M.D.; Geared Head; tooling.
WARNER & SWASEY No. 1 Hand Turret Lathes; bar feed; M.D. (1941 mfg.).

MILLS

VAN NORMAN No. 12 Univ. Horiz/Vert. Mill; M.D. (Late).
VAN NORMAN No. 1-18 Production Mill; M.D. (LATE).
KENT-OWENS No. 2-RV Hand Mill; M.D. (LATE).

PRESSES

BLISS No. 103-A Double Crank; str. side gap frame; 2" stroke; bolster 14" x 42"; M.D. (1944 mfg.).
TOLEDO No. 201-E Dbl. Crank Gap Frame Geared; bed 13" x 53"; stroke 3½".
FERRACUTE No. P-2 Flywheel Press; M.D.
FERRACUTE No. P-3 Flywheel Press; M.D.
ZEH & HAHNEMANN No. 7 Embossing Press; 50-Ton cap.; M.D.
EXCELSIOR No. 20 Deep Throat Press; 26" throat; M.D.
RODGERS 150-Ton 4-Post Hydraulic Platen Type; LIKE NEW.

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"LOOK THESE OVER"

4¼" ACME GRIDLEY Single Spindle Model L Automatic
3'11" DRESES Radial Drill—Motor on arm
16"x8' MONARCH Geared Head Lathe
30"x16' bed AMERICAN High Duty Geared Head Lathe
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
No. 5A BRYANT Internal Grinder
No. 172 HEALD Gap Internal Grinding Machine for large swing
6"x18" LANDIS Type C Plain Grinder
10"x72" LANDIS Type C Hydraulic Plain Grinder —1942
Nos. 4D & 6S POTTER & JOHNSTON Automatic Lathes
Nos. 8A and 9A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathes
No. 26 VAN NORMAN Universal Miller
No. 3 CINCINNATI Dial Type Plain Miller
No. 2 CINCINNATI HS Dial Type Plain Millers
No. 5 CINCINNATI Plain High Power Miller
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
No. 1-18 CINCINNATI Plain Mfg. Miller
No. 12 B&S Plain Bed Type Production Miller
6"x60" P&W Model C Thread Miller
Nos. 64 and 72 FELLOWS High Speed Gear Shapers
No. 12 FELLOWS Gear Shaver 1943
No. 36BM GOULD & EBERHARDT Gear Rougher
16/20" GOULD & EBERHARDT Industrial Shaper
36" OHIO "DREADNAUGHT" H.D. Shaper.
100" BETTS Vertical Boring Mill, 2 heads.
50-ton HENRY & WRIGHT Dieing Machine, 1948.

WIGGLESWORTH INDUSTRIAL CORPORATION
203 Bent St., Cambridge 41, Mass.

No. 2 B & S High Speed Autos. M.D.
No. 25 Heald Rotary Surface Grinder.
P & W 30" Vert. 2-spindle Profiler.
Peerless 6½" x 6½" Hack Saw, hyd.

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4357 St. Paul Blvd., Rochester 17, N. Y.

1941-1953 MACHINE TOOLS

IMMEDIATE DELIVERY — NO PRIORITIES NEEDED

CAM MILLERS
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CENTERING MACHINES
SWEDISH: Double-End, 42" & 60", new
SUNDSTRAND: Double-End, #53, 24" Centers.

CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New) automatic indexing

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle
ALLEN: #2 High Speed 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' and 7', new

GEAR CUTTING MACHINES
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Geear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10" x 24" Hydr. Spur Gears and Splines
INTERNAL GEAR GRINDER, GG-31

GEAR FINISHERS & TESTERS
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 10"x18" 45° angle wheel

3-WAY GUARANTEE

1. Should any machinery purchased from us prove unsatisfactory, you can return the machines within 30 days, via freight prepaid to our plant, and a full refund will be made.
2. Machines at our plant can be demonstrated and tested under power before purchasing.
3. You are dealing with a well-established, highly-rated firm of machinery engineers with over 33 years of proven responsibility.

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: 16-16 Internal Hydraulic
BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS
VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—SURFACE
THOMPSON: Hydr. Surface Grinder, 10 x 18 x 24" New

GRINDERS—THREAD
EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers
TRIPLEX Tool Room Lathe, 14"x60", new

LATHES—TURRET
WARNER & SWASEY: 1A, 2A, 3A & 4A
WARNER & SWASEY #3, #4 & #5 Turret Lathes
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

THREAD MILLERS & TAPPERS
HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13⅛" hole.
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES
BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS
ARTER CARBIDE Tool Grinders
OPTICAL PROFILE GRINDER, Wickman, New
OPTICAL PROFILE GRINDER, Sheffield, used.
AUTOMATIC SCREW MACHINE, Swiss type, ⅝"—used
AUTOMATIC SCREW MACHINE Wickman, Single Spindle, 7/16", New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe 12" dia. x 48" centers
HARDNESS TESTER: Gogan Brinell, Model 16-8
SHEFFIELD Precisionaire Gauge
SWEDISH, Double-End, 42" & 60", new
SUNDSTRAND: Double-End, #53, 24" Centers.
WIRE FORMING MACHINES: 4-slides (new)

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MACHINE TOOL ENGINEERS SINCE 1919

WHY SEARCH?

AUTOMATICS
No. 00G Brown & Sharpe, serial 6370
1½" 8-spindle Conomatic, Timken
7" 6-spindle Baird chucker, Model 76H

BORING MACHINES
3½" Cincinnati Gilbert floor type, 1942
No. 48 Heald Borematic

BROACH
15 ton 36" Colonial vertical surface
10 ton 48" American horizontal hydraulic

DRILLS, Hy. Dy.
20" and 24" Baker box column

DRILLS, Multiple
34" spindle No. A18 Natco

DRILLS, Sens.
No. 2 Allen drill and tapper

DRILLS, Radial
3½ ft. American, motor on arm

DRILLS, Misc.
Natco double end hydraulic, 1947, 6 station

GEAR HOBBERS
Two type A Barber colman
No. 7B Lees Bradner
72" Schuchardt & Schutte, tangential feed

GRINDERS, Centerless
No. 2 Cincinnati

GRINDERS, Cyl.
10"x18" Cincinnati plain Filmatic
10"x36" Norton semi auto.

GRINDERS, Disc.
20" No. 120A Gardner, 1947

GRINDERS, Int.
Nos. 5, 16A and 2436 Bryant
72A3 Heald Gagematic and Sizematic

GRINDERS, Surf.
8"x24" No. 5B Brown & Sharpe, late

GRINDERS, Radius
42 Van Norman

HONES
No. 172 and 2610 Barnes vert. hydr.
No. H2 Micromatic, 1941

LATHES, Eng.
14"x42" Hendey, late
24" x 14 ft. American geared head

LATHE, Mfg.
20"x25" Fay automatic, 1942
No. 6 LeBlond Multi-Cut, 1941
14"x18" Lipe Carbo-Lathe

LATHE, Turret
No. 3A Warner & Swasey, 1941
5¼"x18" swing Libby, late
36" Bullard vertical

MILL, Plain
No. 2 Cincinnati H.S. dial
No. 36 Van Norman H.S. dial

MILL, Prod.
No. 436 Cincinnati Hydromatic
48"x36"x12 ft. Ingersoll adjustable rail planer type

MILL, Spline
4" M80 Taylor & Fenn

MILL, Thread
8"x16" Hanson Whitney 1941

PLANER
36"x36"x8 ft. American

PRESS
15 ton Dennison hydraulic

RIVETERS
Large assortment, ⅛" to ⅝"

SAW
13" Peerless Universal Hack

SHAPER
16" American Auto oiled

ROLL
20 ft. x 3 16" Farnham

SLOTTER
24" Niles Bement Pond

TESTER
50,000 lbs. Baldwin Southwark Tate Emery

THREAD ROLLER
9/16" National Prec.

WELDER
100 KVA Thompson Automatic spot

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16"x78" centers PRATT & WHITNEY Model "C" Toolroom Lathe, taper attachment, chucks, new 1943

28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943

36"x12' centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD

60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse

No. 5 BARDONS & OLIVER Turret Lathe, bar feed, preselector head, new 1943.

No. 5 GISHOLT Turret Lathe, Bar feed and Chuck, New 1943

No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck

No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling

No. 2 CINCINNATI Vertical Mill, dial type, new 1945

No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD

No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse

No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942

No. 4H KEARNEY & TRECKER Vertical Mill, new 1944

3⅜" bar LUCAS Table Type Horizontal Boring Mill, vertical milling attachment

48"x48"x10' NILES Double Housing Planer, box table, DC reversing motor drive.

48" widened to 69"x12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive

No. 16 BLANCHARD Rotary Surface Grinder, 26" magnetic chuck, AC-MD

No. 2 BROWN & SHARPE Surface Grinder, motor inside base, power feeds

25A HEALD Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD

1½" LANDIS Bolt Threader, leadscrews, AC-MD

30" MORTON Hydraulic Keyseater, new 1942

600 Ton CHAMBERSBURG Wheel Press, cast steel frame, inclined, AC-MD

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IMMEDIATE DELIVERY

BLISS No. 5-S Double Action Toggle Draw Press, Bed Area 38"x33", Stroke of Blankholder 10", Stroke of Plunger 21", Air Clutch. New in 1945.

BLISS No. 88 Straight Side Single Crank Press, Bed Area 30"x29", 18" Stroke of Slide, Marquette Air Cushion, 255 ton Capacity.

TOLEDO Double Cranks, Nos. 91-42, 92C, 93½C, 93½E.

CLEVELAND Double Cranks 65-G-72, 45-D-60.
NIAGARA Double Cranks, 67C, 68C, 612C.
BLISS No. 25K Knuckle Joint 600 Ton Capacity.

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GRINDERS—SURFACE

Blanchard No. 16 Rotary—Chuck 26" dia. —Rectifier—MD

Thompson 12"x24" Automatic — Chuck 9"x24"—MD—Late type

Pratt & Whitney 26" Vertical Spindle—Chuck 18"x88"—7' HP spindle motor hydraulic table—Late type

Hanchett Type 400S 30"x60" Vertical Spindle — 60 HP spindle motor — hydraulic table—Late type

LATHES—TURRET

Warner & Swasey No. 2A, 3A and 4A Universal—Arranged bar and chucking —Late types

Gisholt No. 4 and 5 Ram Type Universal —Arranged for chucking—MD—Late type

Gisholt No. 3R Universal—6½" hole thru spindle—Threading attch.—MD—late

Midland No. 5 Universal—3" hole thru spindle—Arranged bar and chucking—MD—Late type

GEAR CUTTERS

Gould & Eberhardt 96" x 30" Automatic Spur & Helical — Auxiliary table — Power feeds—MD

Pfauter No. 5 Automatic Spur, Helical & Worm with attch. for Herringbone—Cap. 118"x22"—MD

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2⅝" CONOMATIC
8 Spindle. Complete with bar racks, extra tools, chip conveyor. Serial 3306-GB. 1944.

INGERSOLL Face Mill Grinder, 1948 Mfg.

ERIE EQUIPMENT CO.
4845 Mt. Elliott WA 1-5343 Detroit, Mich.

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36" and 42" BULLARD VERT. TURRET LATHES, with 4-jaw chuck, M.D.

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Eastern Rebuilt Machine Tools

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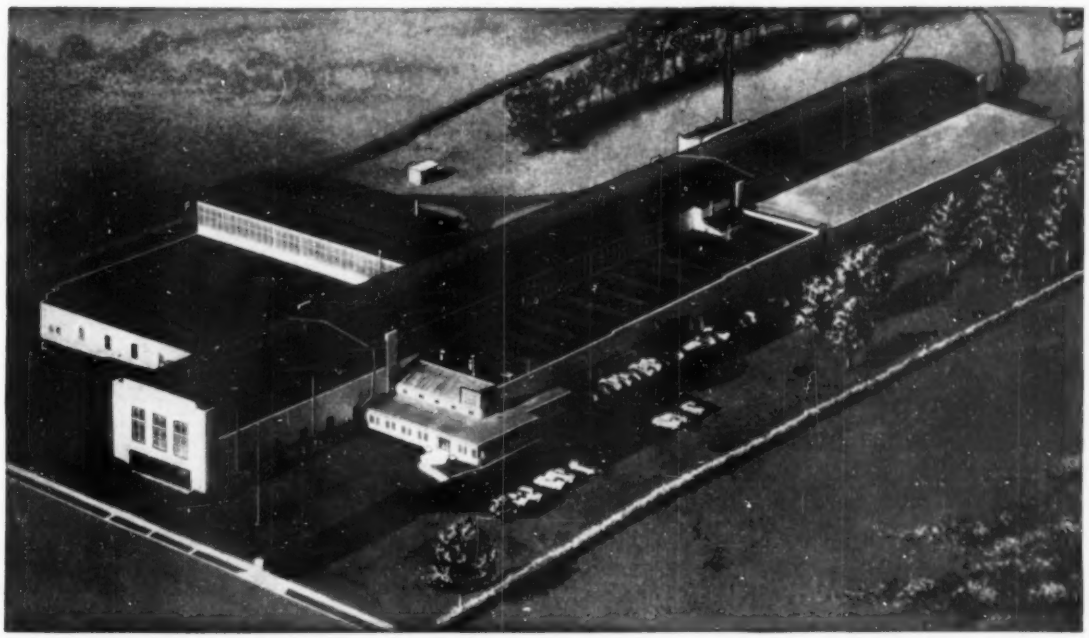

ENGINE LATHES

12"x6' Lodge & Shipley Geared Head, m.d., taper
13"x54" centers LeBlond Geared Head, m.d., taper
13"x5' bed Willard, cone, motorized
14"x6' American High Duty Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x6' Lodge & Shipley Geared Head, m.d.
14"x6' Lodge & Shipley, cone, motorized
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' LeBlond Geared Head, s.p.d.
14"x6' bed Monarch, cone, motorized
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d. taper
14"x8' Sidney Geared Head, m.d.
14"x8' Prentice, m.d., taper
16"x30" centers Monarch, m.d., taper
16"x6' bed Cisco Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Lehmann Geared Head, m.d.
16"x6' Lodge & Shipley Selective Head, m.d.
16"x6' Lodge & Shipley, cone
16"x6' bed Monarch Geared Head, m.d.
16"x72" American Geared Head, m.d.
16"x84" Pratt & Whitney Type B, m.d.
16"x8' bed Reed-Prentice, cone, taper
16"x8' Monarch, cone, motorized
16"x12' bed LeBlond Geared Head, m.d., taper
17"x6' LeBlond Geared Head, m.d.
18"x5' LeBlond Geared Head, m.d.
18"x6'6" bed Greavrs-Klusman Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper
18"x8' bed American Geared Head, m.d.
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley Geared Head, m.d.
18"x8' Whitcomb-Blaisdell Geared Head, s.p.d.
18"x8'6" bed Walcott, cone, motorized
18"x10'6" bed Boye & Emmes, cone, motorized
19"x6' bed LeBlond Geared Head, m.d., later type
19"x10' bed LeBlond H.D., m.d.
19"-38"x10' bed LeBlond Gap Lathe, cone, motorized, taper
20"x8' bed American Geared Head, m.d., taper
20"x8' Cisco, cone, motorized
20"x8' bed Greaves-Klusman Geared Head, m.d. in leg
20"x8' bed Boye & Emmes, m.d.
20"x8' bed Lodge & Shipley Geared Head, m.d., taper, later type
20"x10' bed (6' centers) Sidney Geared Head, m.d., taper
20"-40"x9' bed Rahn-Larmon Gap Lathe, cone, motorized
20"x10' Sidney Geared Head, m.d.
20"x10'6" Boye & Emmes, cone, motorized
20"x10'6" bed Sidney "Tritrol" Geared Head, m.d., late
21"x8' bed LeBlond Geared Head, m.d., taper
21"x10' LeBlond Geared Head, m.d.
23"x12' LeBlond Geared Head, m.d., taper
23"x12' bed LeBlond, cone, motorized
24"x12' bed Boye & Emmes, belt drive
24"x12' Bridgeford Geared Head, m.d., taper
24"x16' bed Lodge & Shipley, cone, motorized, taper
24" raised to swing 32"x22' bed—16' centers New Haven, cone, taper
25"x10' bed LeBlond Geared Head, m.d., taper
25"-50"x8' centers LeBlond Gap Lathe, m.d.
27"x24' bed American Heavy Duty Geared Head, m.d., taper, late type
30"x12'6" bed Niles-Bement-Pond, variable speed m.d., taper
30"x40' bed (33' centers) Betts-Bridgeford Heavy Duty Hollow Spindle, "Oil Country" type, m.d.
30"x13'6" bed Niles-Bement-Pond, m.d.
36"x84" centers American Super-Productive, m.d.
36"x16'6" bed Boye & Emmes Geared Head, m.d.
36"x24' bed (16' centers) Schumacher & Boye, cone, motorized, taper
42" Putnam raised to swing 56½x29' bed Geared Head, m.d., 11'8" centers
42"x180" American Super-Productive Lathe, m.d., taper
48"x33' centers Niles-Bement-Pond, m.d.
72"x7' centers I. H. Johnson

MANUFACTURING LATHES

8' LeSwing, 2 carriages, hardened way
12x18" Reid Small Piece Production lathe, Model 6WSL, m.d.
No. 3 Lodge & Shipley Duomatic, m.d., late type
No. 3A Lodge & Shipley Duomatic, m.d., late type
Model B1—⅝ H.P. Blount Speed Lathe, m.d.
W. C. Lipe Carbomatic Lathe, m.d.
Colborne Mfg. Bench Type Speed Lathe, m.d.
No. 4 LeBlond Boring Lathe, 37' bed, 4" hole, m.d., latest
No. 9, No. 12 LeBlond Multi-Cut, m.d.
4x60" LeSwing, m.d.
8x132" LeSwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
Schauer Type NA 2B Speed Lathe, m.d., latest
30"x10' LeBlond Turning Lathe, cone
12"x18" centers Lipe-Carbo Lathe, m.d.

HAND MILLING MACHINES

No. 1 U.S. Hand Miller

UNIVERSAL MILLING MACHINES

No. 2½ LeBlond Heavy Duty, cone, motorized
No. 3A Brown & Sharpe Standard, m.d., later type
No. 3B Milwaukee

PLAIN MILLING MACHINES

No. 1B Milwaukee, m.d.
No. 2 Rockford, m.d.
No. 4 Ohio, cone
No. 4 Cincinnati Plain Medium Speed Dial Type, m.d., late
No. 4G LeBlond, m.d.

IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK AUTOMATICS, BOLT THREADERS, BORING MILLS, DRILLS, GRINDERS, HAMMERS, HONING MACHINES, GEAR MACHINERY, MFG. & VERTICAL MILLING MACHINES, PIPE MACHINES, PRESSES, PUNCHES & SHEARS, PLANERS, SAWS, RAILROAD MACHINERY, SHAPERS, SLOTTERS, TAPPERS, SHEET METAL MACHINERY, TURRET LATHES, ETC.

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★ GRINDERS

CINCINNATI Cylindrical, 12"x18", M.D., Older Type.
INGERSOLL Cutter (Tub Type).
NORTON Cylindrical 23"x72", M.D., 1942.

★ MILLERS

CINCINNATI No. 2MH, Universal, 1942.
CINCINNATI, No. 4, Vertical Mill, 1940.
INGERSOLL Planer Type Mill, 24"x24"x 12", 2 Swivel Heads, Adj. Rail, M.D.
INGERSOLL Planer Type Mill, 24"x24"x 96", 3 Heads, Adj. Rail, M.D.
INGERSOLL Openside Planer Type Mill, 42"x42"x16', M.D.

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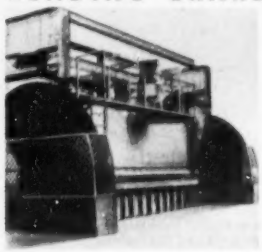

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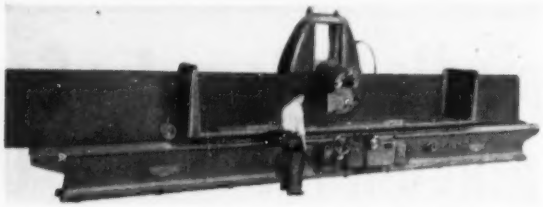

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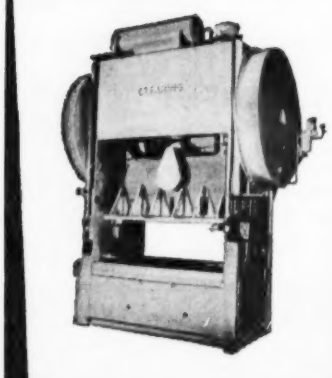

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8	24-30-36-38-40-44-48
9	24-28-32-40
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12	20-28-32-36
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5/32	32-36-40
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7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
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7/16	12-16-18-22-24-27-28-30-32-36-40
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2	56-64
3	56
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5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
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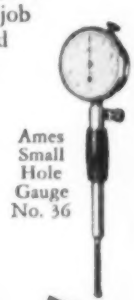

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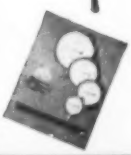

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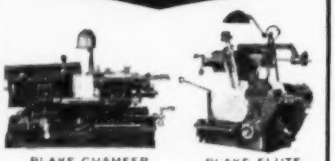

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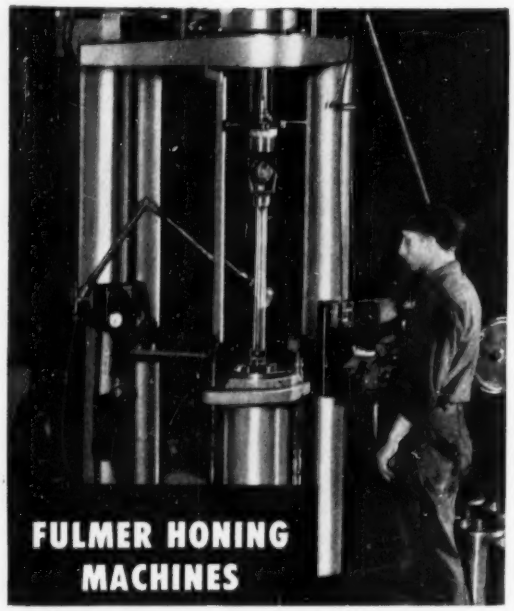
for precision control over SURFACE FINISHING OF INTERNAL BORES



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- One operation grinds both lips
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OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

HY-TEN

"B" No. 3X HEAT-TREATED BARS

This higher-priced alloy steel can save you money!

"B" No. 3X heat-treated bars offer many production economies, even though machined at about ¾ths the speed of annealed bars. They are supplied to your desired physical properties, and can be machined more easily than standard heat-treated bars with equivalent properties. The expense of scaling, distortion, straightening, and often grinding, are eliminated — as well as the cost of extra handling and heat treating of finished parts!

Although the cost is a little more than for ordinary annealed stock, a trial order will convince you of the true economy of HY-TEN "B" No. 3X heat-treated bars! Just call your nearest WL representative.

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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Drill Grinder with ⅜ inch capacity holder on left and 2½ inch on right side. Can also be furnished with a general purpose grinding wheel on left end instead of the small drill holder. Also available for wet grinding.

A POINT TO REMEMBER

A drill point that is sharp and correctly ground will—

(1) drill to exact size

(2) drill faster

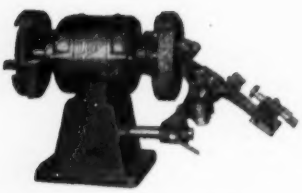
(3) drill more holes per grind

(4) require less power

(5) reduce breakage

(6) cost less to regrind

(7) increase life of drill as less metal is removed each time drill is sharpened.



Bench type Drill Grinder with ⅜ inch capacity holder. Also made in 1¼ inch capacity Pedestal type.

It naturally follows that a Drill Grinder will quickly pay for itself in increased production and lower cost direct and indirect labor.

Write for catalog 72 AN today!

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

From the *American Machinist* Library of Tips for Top Shop Men

IF your plant is still departmentalized, study the advantages of straight-line rearrangement. Handling is usually too expensive nowadays to justify the luxury of having each type of machine tool segregated. The same goes for heat treating, cleaning and assembly.

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From

BATH TUBS TO BOMB CASINGS

Here are a few of the wide range of products made from dies produced by UNITED Tool and Die, Inc.

Included in this group is a Spinner Basket for a leading washing machine manufacturer, a bath tub stamping for another well-known manufacturer and a small stamping for the producer of various sizes of roasters.

The point is that regardless of the depth of draw or the size of the stamping required UNITED has the Engineering Organization—the Shop Facilities—and the experienced "know-how" to produce the dies to help you solve your production problems.

DO YOU HAVE WARPAGE PROBLEMS IN PORCELAIN ENAMELING YOUR FLAT PANEL WARE?

Let us help solve your porcelain panel problems. We have developed special die techniques which assure porcelain panels thru furnace without warpage. Let us consult your engineers on any die problems.

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SALEM, OHIO

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Dial Gauges and Indicators

Model C 50 B

are accurate, reliable and built to stand hard usage.

Model "C 50 B" has a 2¼" overall diameter, balanced dial 0-25-0 with .0005" graduations, ⅛" range and movable dial easily set at zero.

The cases on all R. & S. Gauges are made from sturdy castings. The case and plate are two separate units so that repairs can be made easily.

This style instrument can be furnished with various dials, graduations and ranges, in both English and Metric. There is a R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

FRANK E. RANDALL CO., INC.
248 Ash St.
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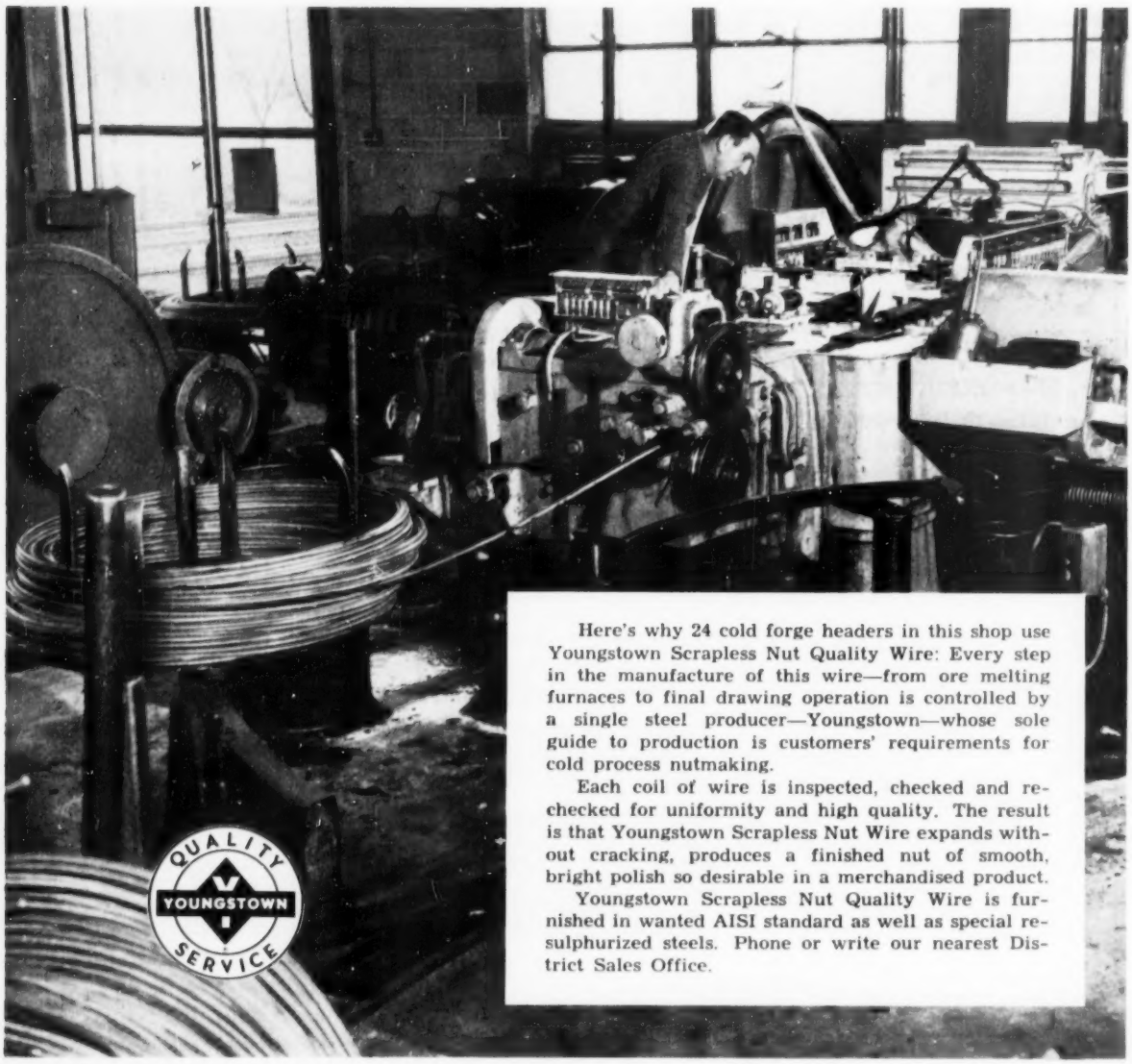
Makers of Dial Gauges Since 1896

NUTS DON'T CRACK WHEN FORGED FROM YOUNGSTOWN SCRAPLESS NUT WIRE



Here's why 24 cold forge headers in this shop use Youngstown Scrapless Nut Quality Wire: Every step in the manufacture of this wire—from ore melting furnaces to final drawing operation is controlled by a single steel producer—Youngstown—whose sole guide to production is customers' requirements for cold process nutmaking.

Each coil of wire is inspected, checked and rechecked for uniformity and high quality. The result is that Youngstown Scrapless Nut Wire expands without cracking, produces a finished nut of smooth, bright polish so desirable in a merchandised product.

Youngstown Scrapless Nut Quality Wire is furnished in wanted AISI standard as well as special resulphurized steels. Phone or write our nearest District Sales Office.

Youngstown SCRAPLESS NUT QUALITY WIRE

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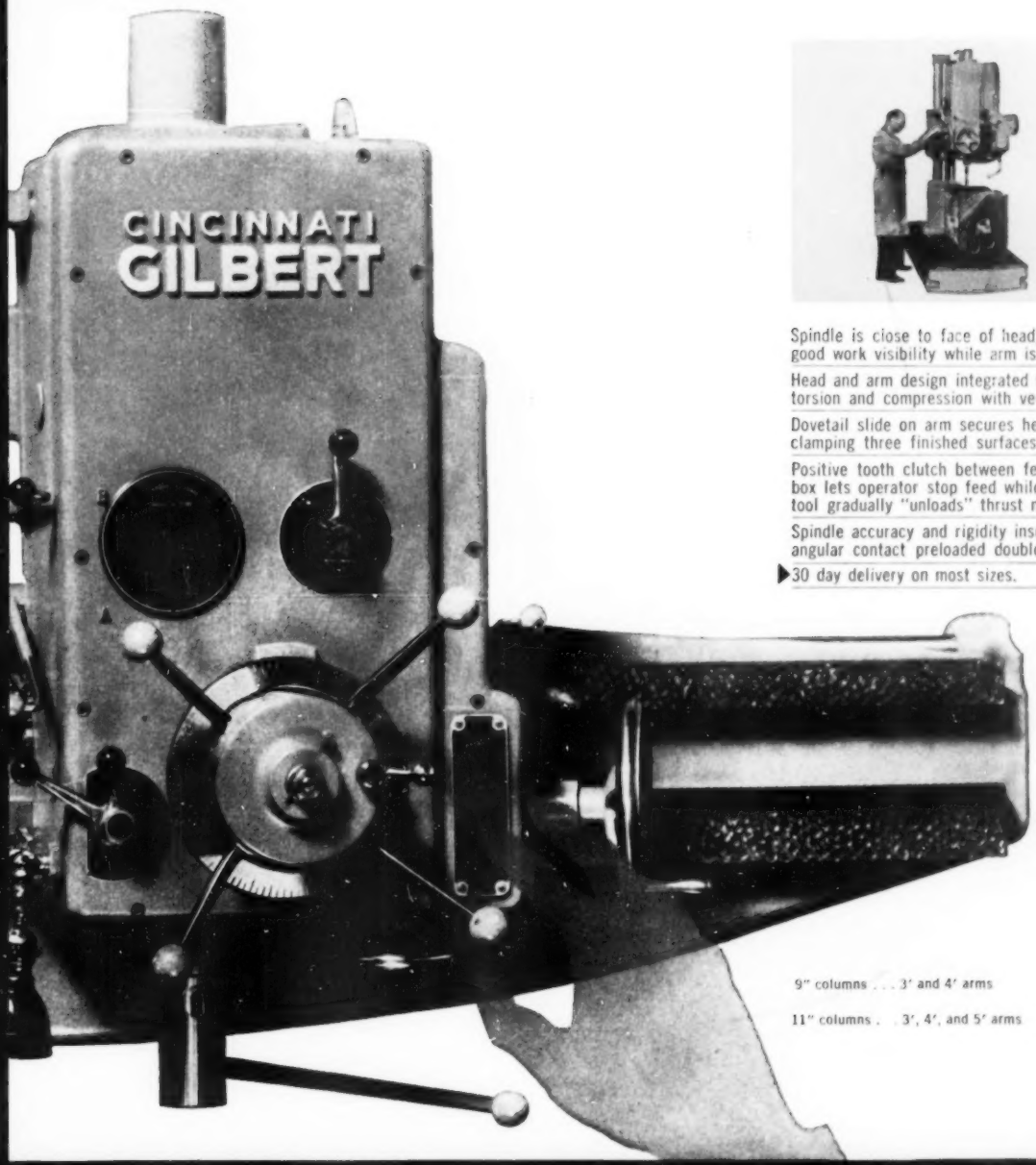
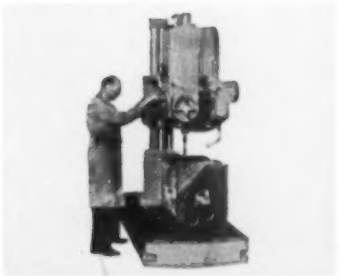




Spindle is close to face of head, provides good work visibility while arm is low.

Head and arm design integrated to withstand torsion and compression with very low deflection.

Dovetail slide on arm secures head by clamping three finished surfaces together.

Positive tooth clutch between feed worm and gear box lets operator stop feed while spindle turns and tool gradually "unloads" thrust normally absorbed by arm.

Spindle accuracy and rigidity insured by four angular contact preloaded double zero ball bearings.

▶30 day delivery on most sizes.

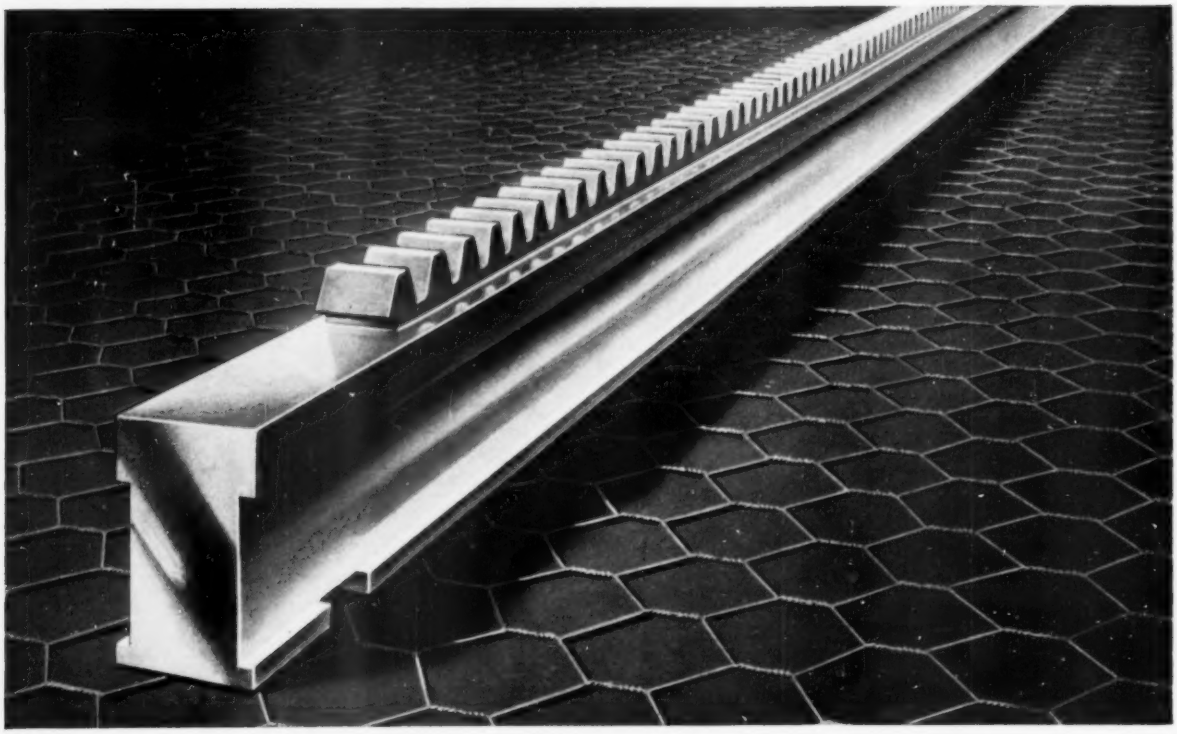
9" columns . . . 3' and 4' arms

11" columns . . 3', 4', and 5' arms

Fast response to all controls with minimum effort, plus positive "no-drift" clamping, make it easy for Cincinnati Gilbert operators to get more work done accurately and on time. No one detail is responsible: it's the combination of "clean" design and rugged construction that makes Gilberts consistently pay high returns on your investment. 9" and 11" columns. Ask your Gilbert representative to demonstrate why "those who buy Gilbert buy Gilbert again."

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



7-foot Graph-Mo® steel rack hardened without distortion

THIS long, slim gear rack, part of a new Wean Equipment Company hexagon netting machine, started out as a problem child.

With the first steels tried, case hardening caused extreme distortion. And the few racks that did harden straight enough to be useable did not wear well.

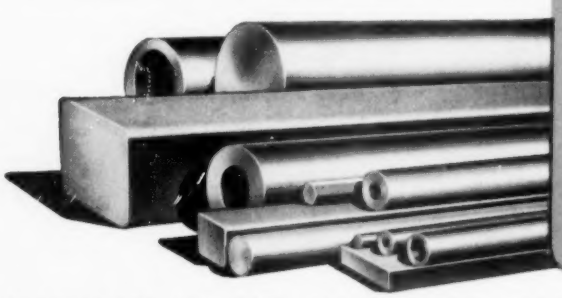
As soon as the manufacturer turned to Graph-Mo®, one of four graphitic steels developed by the Timken Company, the problem vanished. Because Graph-Mo responds uniformly to heat treatment, the racks hardened without distortion. Heat-treating scrap was completely eliminated.

In addition, the Graph-Mo racks gave exceptional wear. First, the free graphite in Graph-Mo's structure acts as a built-in lubricant—reduces friction between the rack and the gears it engages. Second, diamond-hard carbides in Graph-Mo give it great resistance to abrasion and wear.

On top of all this, there was a 30% saving in machining time—Graph-Mo being easier to machine than ordinary tool steels.

For helpful information on the use of Graph-Mo and other graphitic tool steels for machine parts, dies, punches and gages, write for the 10th edition of "Timken Graphitic Steel Data Book". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



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TRADE-MARK REG. U.S. PAT. OFF.

Fine Alloy

STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING